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16 Pages of Photogravure

How the World Is Fed

A Practical Analysis of the Food Supply of the World, of the Relations of War and Science thereto, and of America's Great Contribution to Humanity's Market Basket

WILLIAM JOSEPH SHOWALTER

With 85 Illustrations

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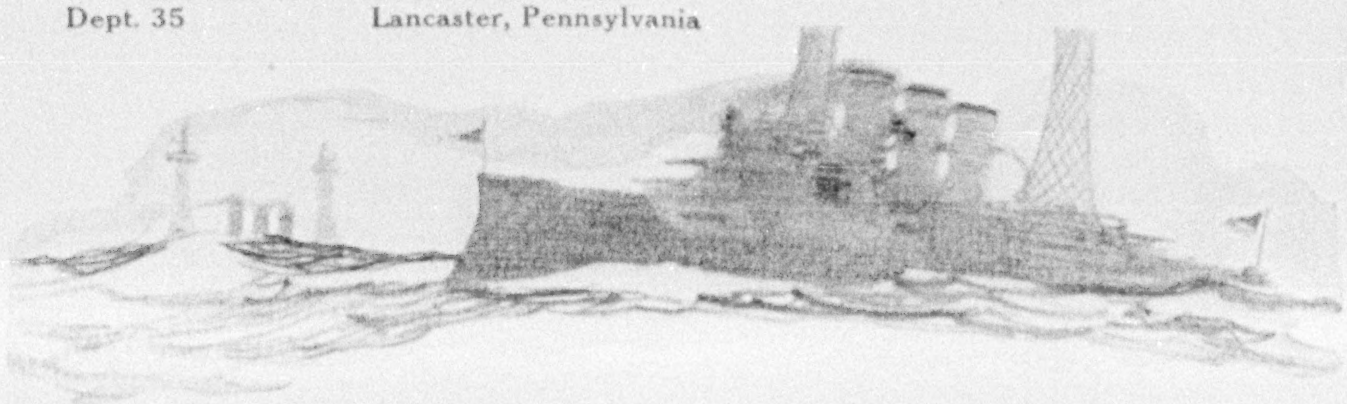

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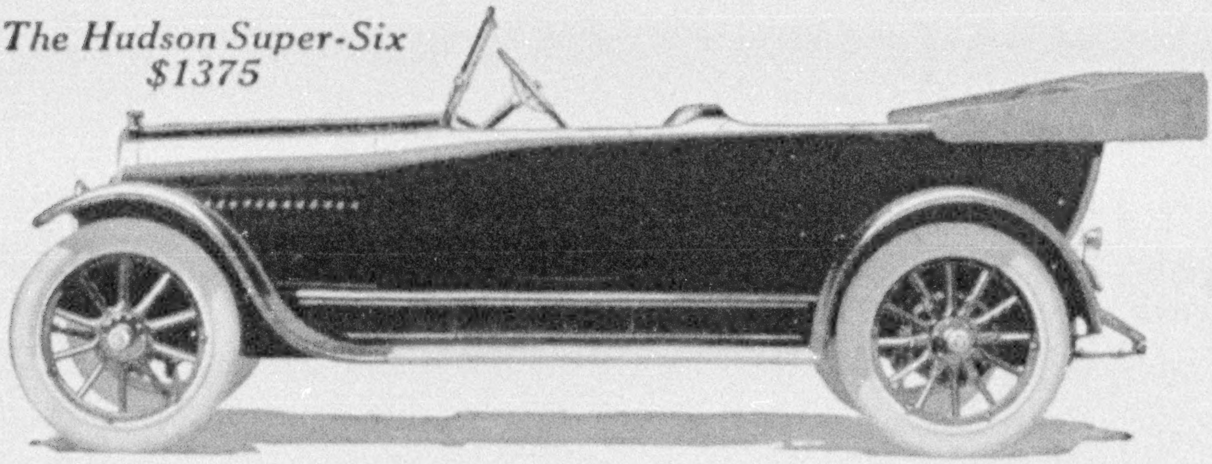

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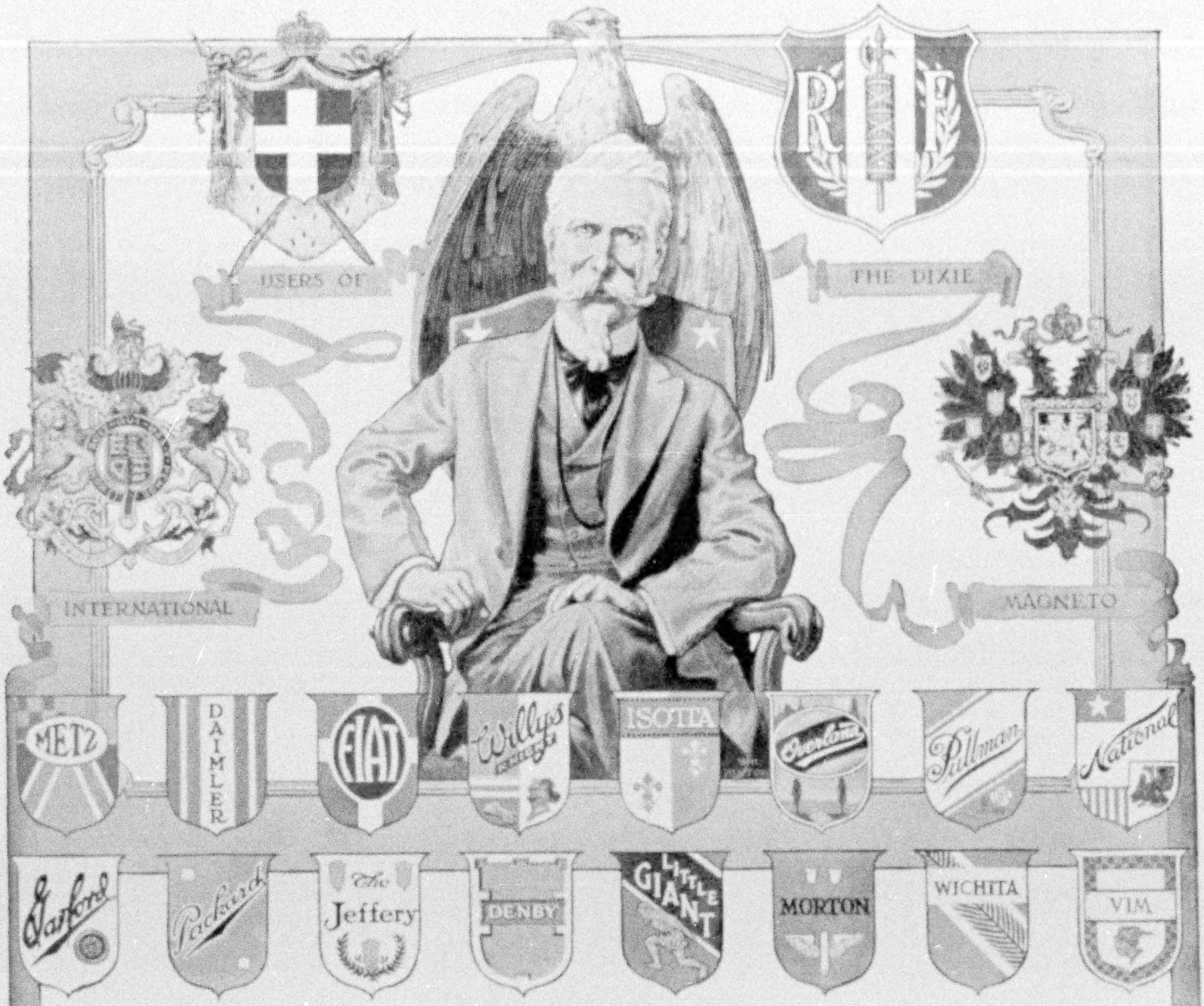
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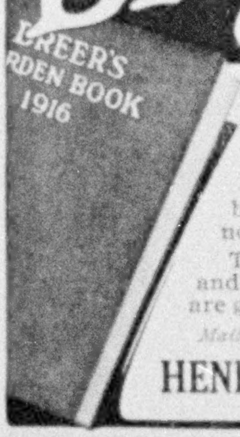

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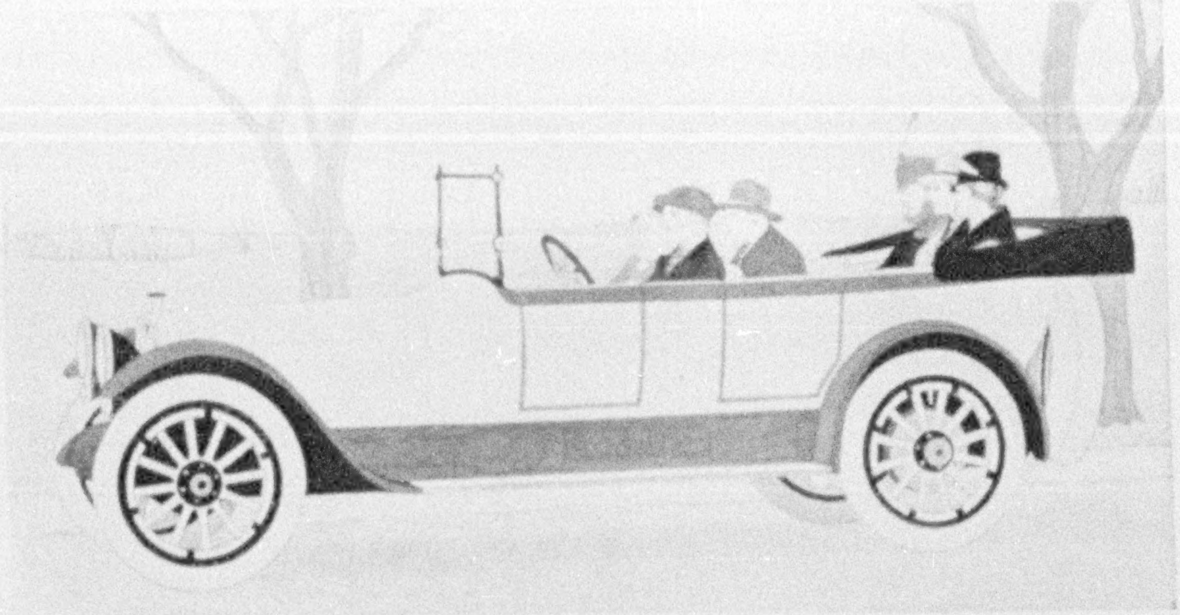

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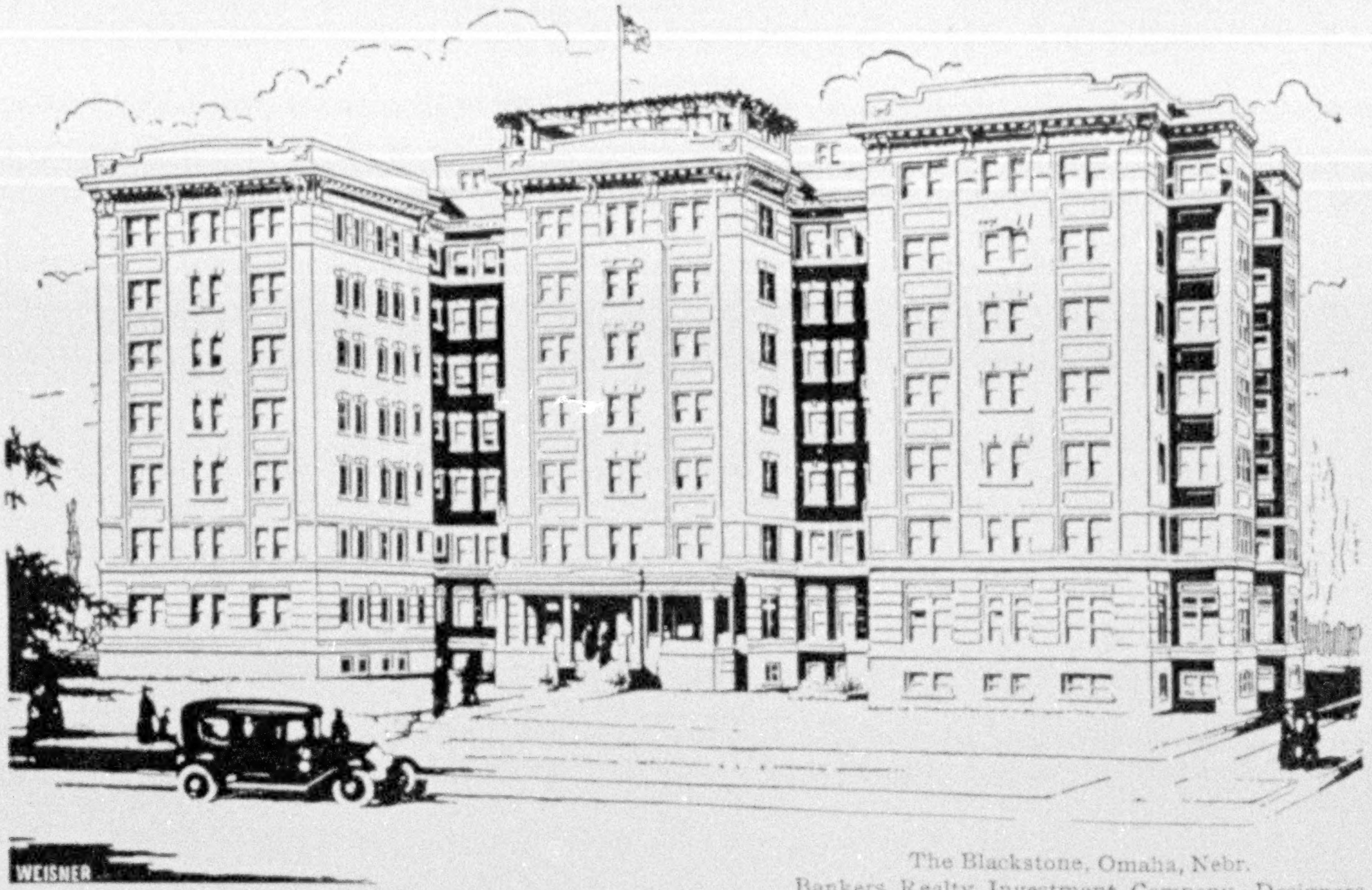

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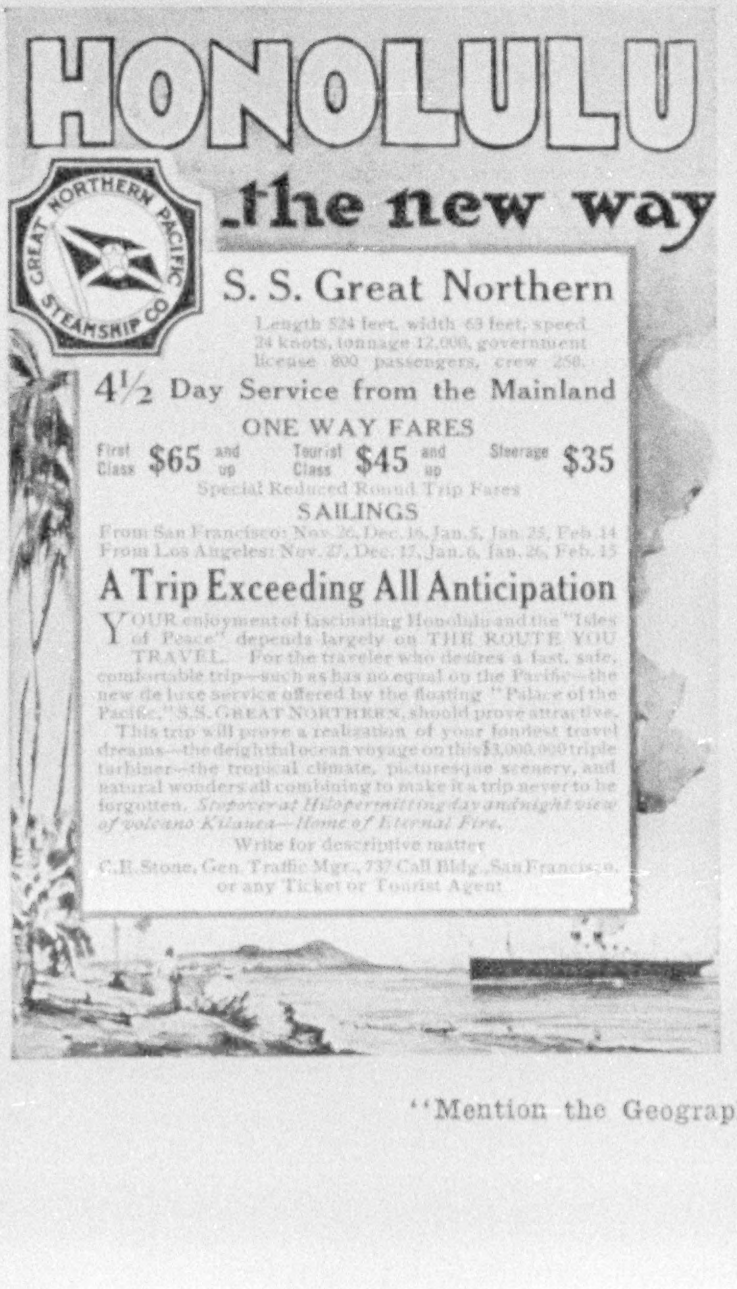

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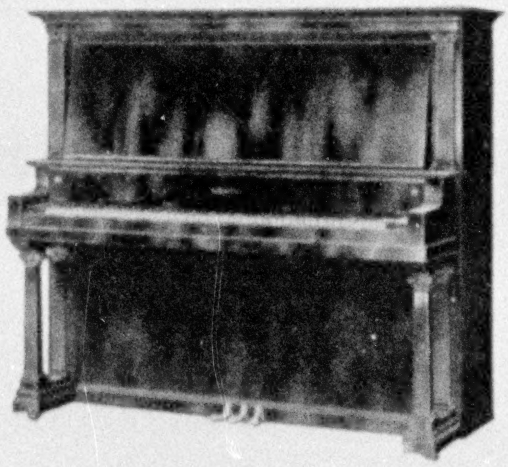

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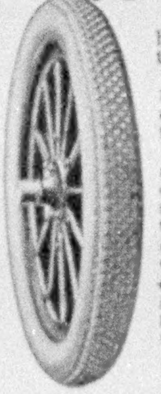

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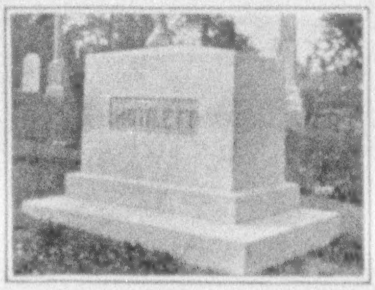

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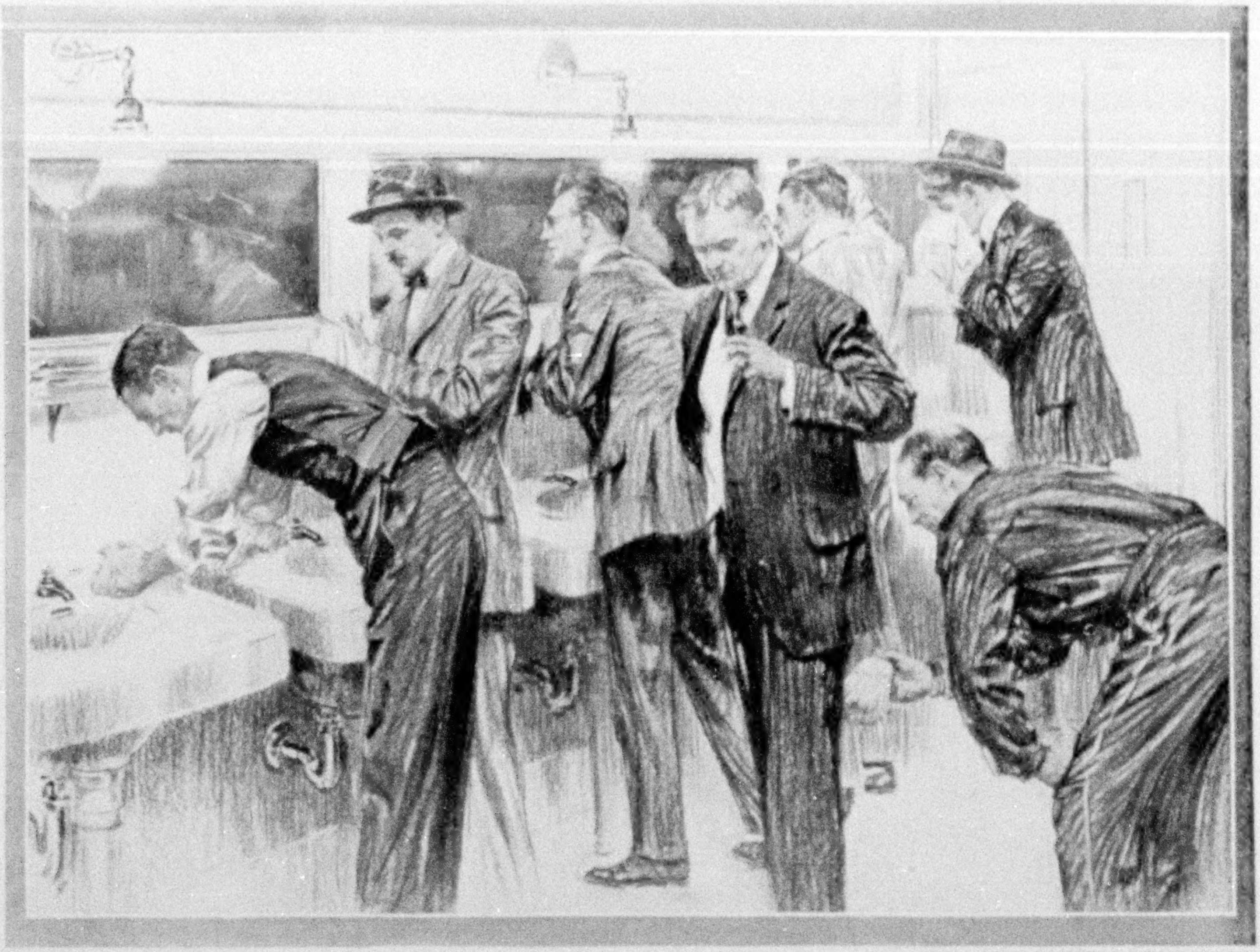

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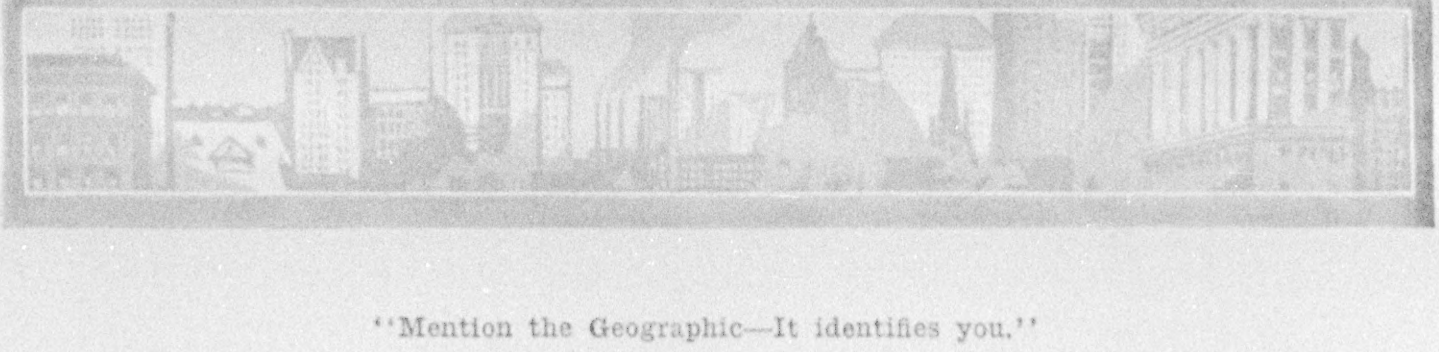

VOL. XXIX, No. 1 WASHINGTON JANUARY, 1916

THE NATIONAL GEOGRAPHIC MAGAZINE

HOW THE WORLD IS FED

BY WILLIAM JOSEPH SHOWALTER

AT THE present juncture, while great issues of world politics hang critically upon the effort of the Entente Powers in the European war to force the Central Powers into submission by drawing around them the steel ring of war and the cold ring of hunger, it is more than interesting to take an inventory of the world's market basket, and to pause for a passing moment to see what effect war has had on the world's food supply in the past, what effect it is having today, and, if possible, to forecast its effect upon the future food problems of the earth.

If we go back one hundred years it will be discovered that France was facing almost the same problems then that Germany is facing today. England's fleet blockaded France's ports then just as they blockade Germany's today, and oversea foodstuffs had little chance to reach the French.

How far this went, and how great an effect it had on conditions in Napoleon's Empire, is revealed by the fact that sugar sold for two dollars a pound. And that the world is not sugar-hungry today is due to the steps taken by Napoleon to overcome the effect of the blockade on sugar. Years before, some Prussian scientists had been trying to get sugar from the beet, and, under the patronage of the King of Prussia, Frederick William III, succeeded in their task.

Napoleon borrowed their ideas, set up beet-sugar factories around Lille, and gave to the beet-sugar industry that impetus which has resulted in its development to a point where it yields half of the world's supply of sugar (see page 86).

WAR AND CANNED GOODS

The Little Corporal saw himself seriously embarrassed in the matter of food supplies for his army. He wanted something for his men besides things that were dried or smoked—a desire that was enhanced by his knowledge that millions of dollars in valuable but perishable foods were wasted because of the lack of adequate means of preserving them.

He therefore offered a prize of twelve thousand francs to any one who would devise a practicable method of preserving such foodstuffs. Such a method was quickly evolved, and out of it has grown the world's canning industry—one of the important steps that civilization has taken in the direction of insuring mankind against famine (see also page 66).

It is not improbable that the present war will bring to mankind new methods in the feeding of the race that will prove as important as those brought out by the Napoleonic wars. It has been announced lately that the Germans have devised a new synthetic method of producing protein. It is said that they feed yeast with a combination of sugar and nitrogen from the air, and thus secure that most important of all of the elements that enter into the world's diet—protein. Examples of protein are the whites of eggs, the

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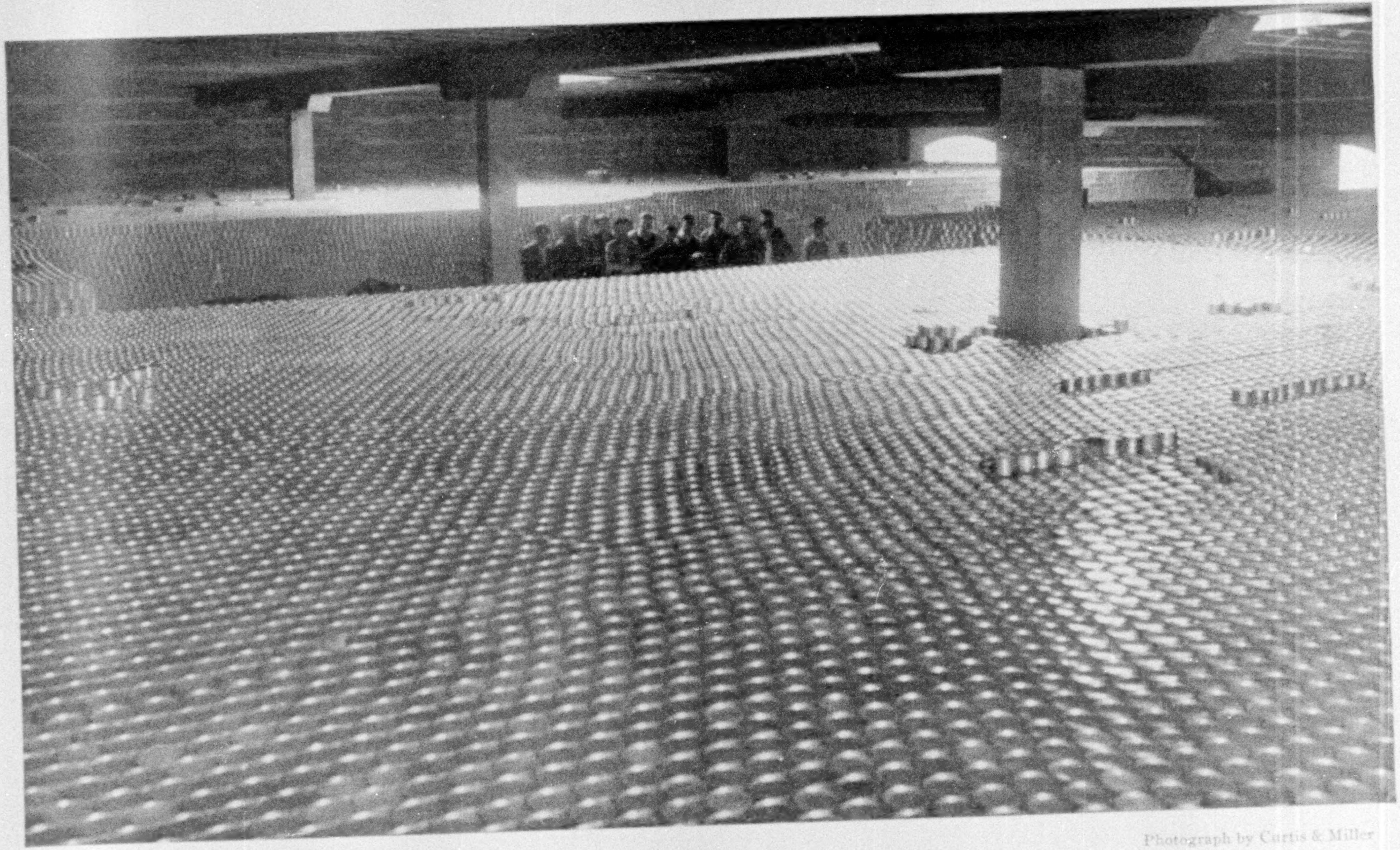

Photograph by Curtis & Miller

CANNED SALMON IN THE WAREHOUSE READY FOR DISTRIBUTION

Some of the most important advances man has made in his food supply have been the result of war. Napoleon's bounty brought about the development of the art of canning foods (see page 1). Before his day not even the scientist in his laboratory could "put up" a can of food; today there is not a rural housewife so unscientific as not to be able to do so. The commercial canneries of the United States alone now produce about twenty cans of fruit and vegetables and five pounds of canned fish and shellfish for every man, woman, and child in the country. And this takes no account of that vast quantity of fruits and vegetables canned by the millions of farmers' wives in their own homes. The tens of thousands of cans in this warehouse, which make the men in the middle background appear lost, give some idea of the magnitude of our fish consumption, which, however, is smaller per capita than that of most nations.

muscles of meats, the casein of milk, the gluten of flour, and the nitrogenous fats.

It may also happen that as a result of the war will come the utilization of other plant products than those now entering into direct use as human food. There are approximately half a million species of plants in the world, and yet only a few thousand of them are used at all for food, while only a few hundred of these are used to any important extent. Some of the plants which we now grow are expensive food-producers, some produce food that is difficult to digest, and some give a small yield per acre.

DEVELOPING NEW FOODS

We are constantly developing new foods. It is only little more than half a century since the tomato was a curiosity of the South, known as the "love apple," and used to scare the slaves, who thought it poisonous. Corn came to us from the Indians, and has become one of the leading cereal crops of the world. It is less than a century ago that the lima bean came to us from South America, and the potato was unknown to civilization before the white man went to Peru and Colombia (see page 42).

Today representatives of all of the leading nations are scouring the remote places of the earth for crops which promise to increase the world's total yield of food, as well as its per-acre production. In our own Department of Agriculture we have a division which has brought perhaps 40,000 different kinds of plants into the United States, many of them to be placed on trial as food-producers.

The Mission Fathers of our Southwest, who brought the olive and the date from the Mediterranean region, gave to California some of the richest olive and date orchards in the world, while a woman missionary, traveling in Brazil, sent us cuttings from which the great orange-growing industry of our country has been developed (see page 71).

FRUIT AND VEGETABLES HAVE BEEN WONDERFULLY IMPROVED

Not only is mankind gradually increasing the possible acreage for the growing of foodstuffs—and statistics indicate that only the most fertile third of the world's potential food-producing acreage is under cultivation today—but the crops themselves are being constantly improved and their natural per-acre yield increased.

It is a far cry from the little old knotted and gnarled apples of a few centuries ago to the magnificent Stayman winesaps, York imperials, and Albemarle pippins of today; and it is also a far cry from the unimproved, small and hard peach of the olden days to the big, luscious Alberta of the present; nor is the change that has come over the potato since Burbank begun his experiments any less noted. Both in the animal and in the vegetable world a marked improvement is constantly taking place. Whether there will be further improvements as a result of the war in Europe remains to be seen.

WHAT OF THE FUTURE?

Many men are inclined to sound a pessimistic note as to the adequacy of the world's food supply for future generations, and, like Malthus a hundred years ago, are inclined to predict that the day has at last come when the human race must cease to expand its numbers, or else face inevitable hunger.

And when we consider how many mouths there are in this world to feed, and how much food it takes to satisfy them, little room is there to wonder at this note of pessimism.

The earth's population today reaches a grand total of about 1,700,000,000 souls. If they were all set down at a banquet it would require sixteen tables reaching around the globe to seat them. For every ounce of food they ate, the dinner-giver would have to provide 53,000 tons of provisions, and if the dinner were no more than a democratic dollar-a-plate affair, it would cost, in the aggregate, as much as it costs to run the United States government a year and a half.

Expressed in terms of annual consumption, the world's market basket is one that defies portrayal in weight and size. One is forced to cast around for new units of measurement to give a proper idea of its proportions. Assuming that the average inhabitant of the earth uses two pounds of provisions a

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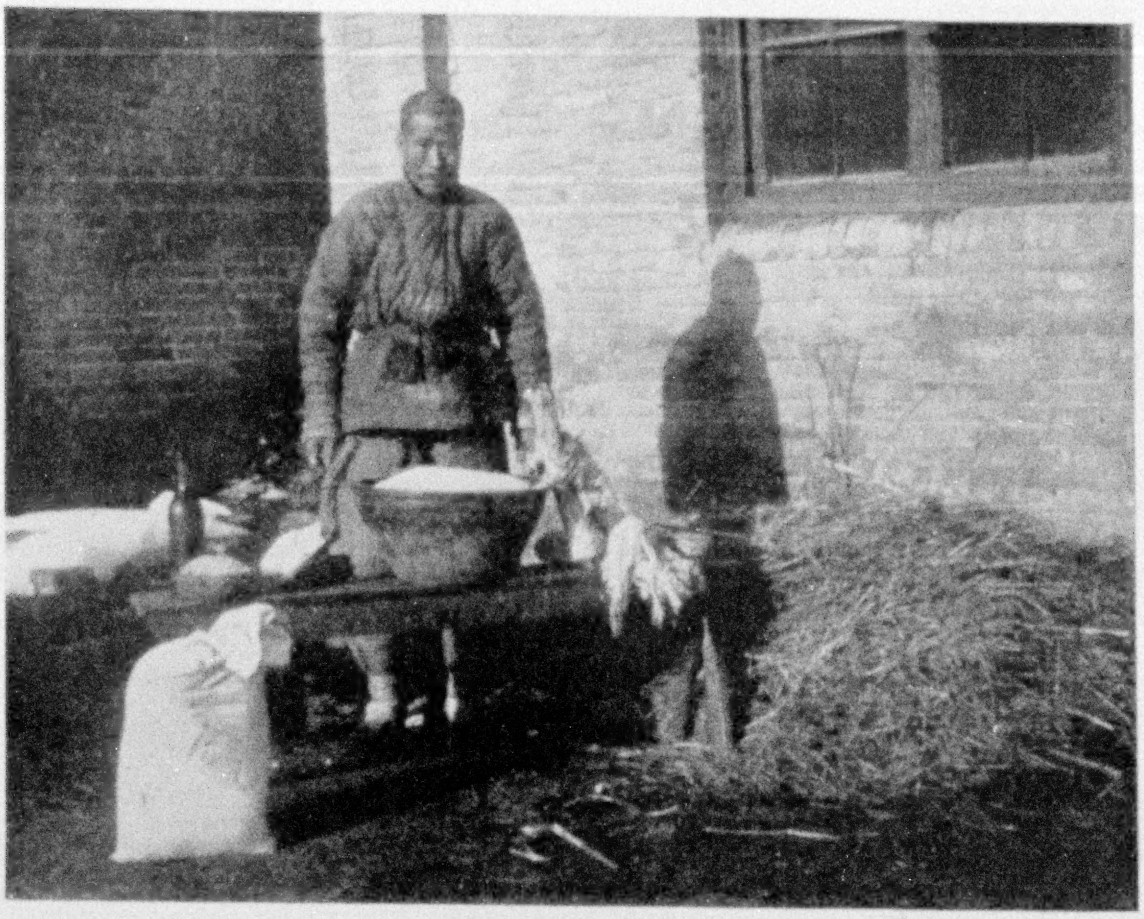
Photograph from U. S. Department of Agriculture

TOMATO PLANTS TRAINED ON TWINE TRELLISES

It is only a generation since the tomato was first accepted by civilization, and yet today millions of people regard it as an almost indispensable part of the kitchen vegetable supply. New Jersey is our leading tomato and asparagus producing State; New York leads in cabbage, onions, and sweet corn; Florida holds first place in the production of green beans, cucumbers, egg plant, and lettuce; California produces more cantaloupes and muskmelons than any other State, and Texas makes its bid for vegetable-producing fame by leading the procession as a producer of watermelons.



Photograph from Rev. B. H. Johns

A DAY'S RATIONS FOR 43 BOYS: TIENTSIN, NORTH CHINA

The food for one day (two meals) is, beginning at the left: bag of wheat flour for bread, 32 pounds; bottle of sesame seed oil; little basket of sea salt; two pounds of bean curd (in wicker ladle); large stone bowl of rice, 33 pounds, and several heads of Chinese cabbage. The bundle of dried grass at the right is the fuel for preparing it.

day, the total for the year would amount to a billion and a quarter tons. It would require a string of cars, carrying thirty tons to the car and reaching eight times around the earth, to haul this material.

THE AVERAGE RATION

The fact, however, is that the average inhabitant of the earth probably uses more than two pounds of provisions a day. The steerage passengers on English ships are allowed 2½ pounds each a day. Even the prisoner in the average jail gets more than 2 pounds; the Russian conscript 4 pounds; and the Austrian common soldier 2½ pounds a day.

Still another way to get an idea of the size of the world's food problem is to assume that the average individual consumes ten cents' worth of food daily. On this basis it would require the entire national wealth of the United States, the richest nation of all history, to pay the world's food bill for twenty-six months. For every cent per day per capita that the cost of living increases, more than $6,000,000,000 is added to the world's annual market-basket expense.

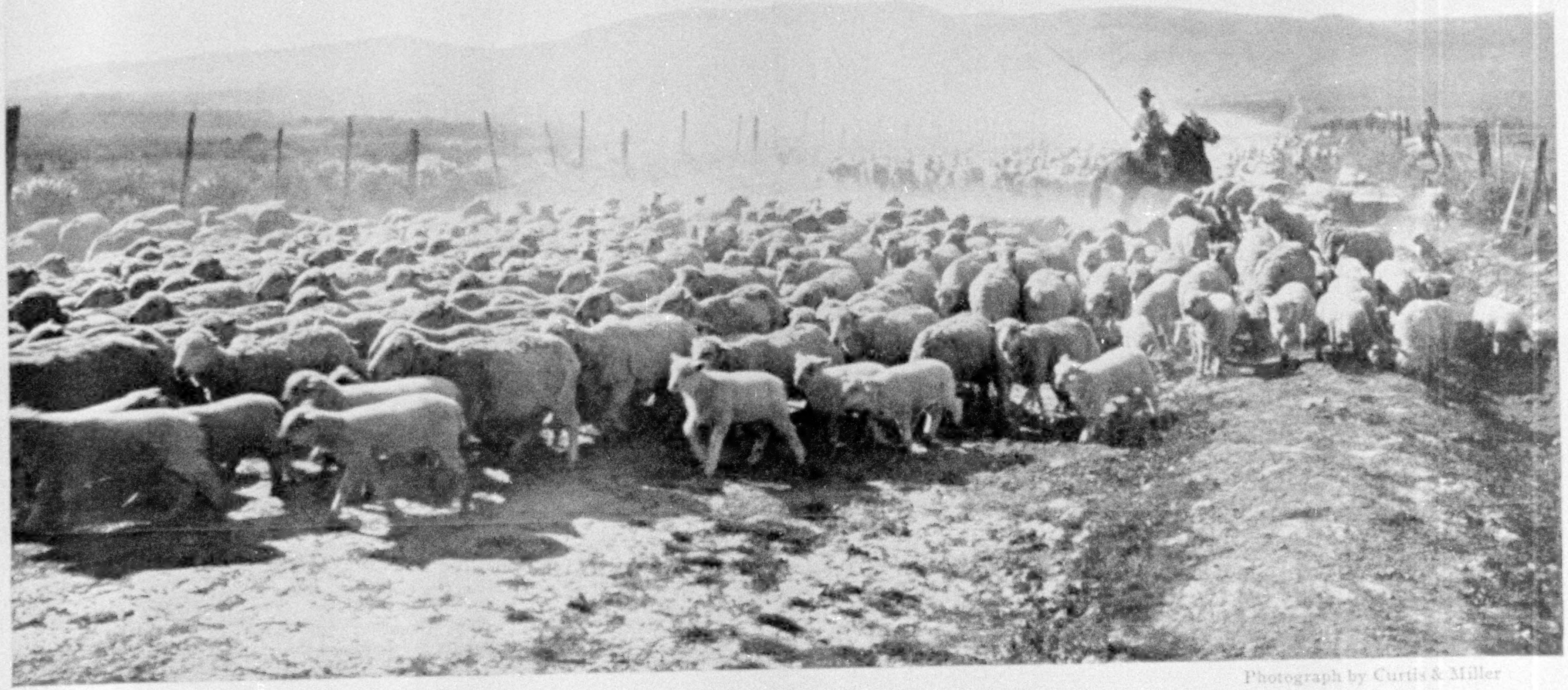
STARVATION STILL REMOTE

But when one considers the possibilities of future food production, it is difficult to have much faith in the prophecies of pessimism of these twentieth-century successors of Malthus (see also page 91).

For instance, in the United States we have 935,000,000 acres of arable land, only 400,000,000 of which are under cultivation. Yet, with less than half of our available land utilized, the United States produces one-sixth of the world's wheat, four-ninths of its corn, one-fourth of its oats, one-eighth of its cattle, one-third of its hogs, and one-twelfth of its sheep.

Even with the land now under cultivation, if we produced as much wheat per acre as England and Germany, we could supply the world with two-thirds of its flour. If we produced as much corn to the acre as they do, we could double the world's supply of that product.

Today the United States has a total



Photograph by Curtis & Miller

SHEEP IN AN IRRIGATION DISTRICT: WASHINGTON STATE

"Taking the world's supply of sheep, cattle, and hogs, and making proper allowances for less improved methods of stock-raising on other parts of the globe as compared with those of the United States, it appears that mankind at large uses in the neighborhood of 47,000,000,000 pounds of meat a year," which is about 49 pounds per capita, as compared with America's 172 pounds (see text, page 12).

cereal crop of 5,000,000,000 bushels. Were all of our arable land under cultivation and producing only according to our present standard, which is less than half as high as that of western Europe, we could add enough cereals to take care of an additional population the size of that of Europe (see also page 91).

LITTLE ROOM FOR PESSIMISM

When one has lived on land, as the writer has done, which, at the end of the Civil War, did not produce more than eight bushels of wheat and twenty bushels of corn to the acre, and has seen this land produce as high as forty-five bushels of wheat and a hundred bushels of corn, it is difficult to take any other than an optimistic view of the possibilities of American agriculture.

Not only are there infinite possibilities yet untouched in our own country, but also in most of the other countries of the earth as well. For instance, Russia, that land for which nature has done so much, endowing it with food-producing possibilities such as few other countries possess, has a wheat yield of only ten bushels to the acre.

When the day comes, as come it certainly will, that Russia produces as much per acre as Germany and England, and when the untold millions of acres of undeveloped land are opened up and settled, as they are destined to be, alone she can supply the world's present needs in cereals except rice and corn (see pages 24 and 25).

TROPICAL POSSIBILITIES

Nor is that all. Any one who has traveled through the tropics, studying the production of foodstuffs there at first hand, cannot fail to understand that vast potential food sources still lie untouched. The wonderful discoveries of Ross and Reed and their coadjutors, of the methods of preventing malaria and yellow fever, followed by the mastery of the secrets of the bubonic plague and beriberi, and the application of these lessons in Cuba, at Panama, and elsewhere in the tropical world, have made it possible for civilized man to open up gardens of plenty of which he never before dreamed.

Untold millions of acres of densest jungles are, so far as man is concerned, nothing more than lands of infinite richness wasting their sweetness upon the desert air of unutilized opportunities.

Not long ago I visited the ruins of Quirigua, in Guatemala. The United Fruit Company had set apart several hundred acres as a reservation for the protection of the ruins. The jungle forest of the reservation, bordering the banana clearings, towered like a green wall a hundred feet high, and the undergrowth was so dense that no man could penetrate it save by cutting his way through with a machete.

There I saw the contrast between the past and the future of the tropical world. The banana plantations, stretching for miles and miles up and down the Motaga River valley, were producing millions of bunches of bananas, where but a few years before had existed the same sort of jungle as that at Quirigua.

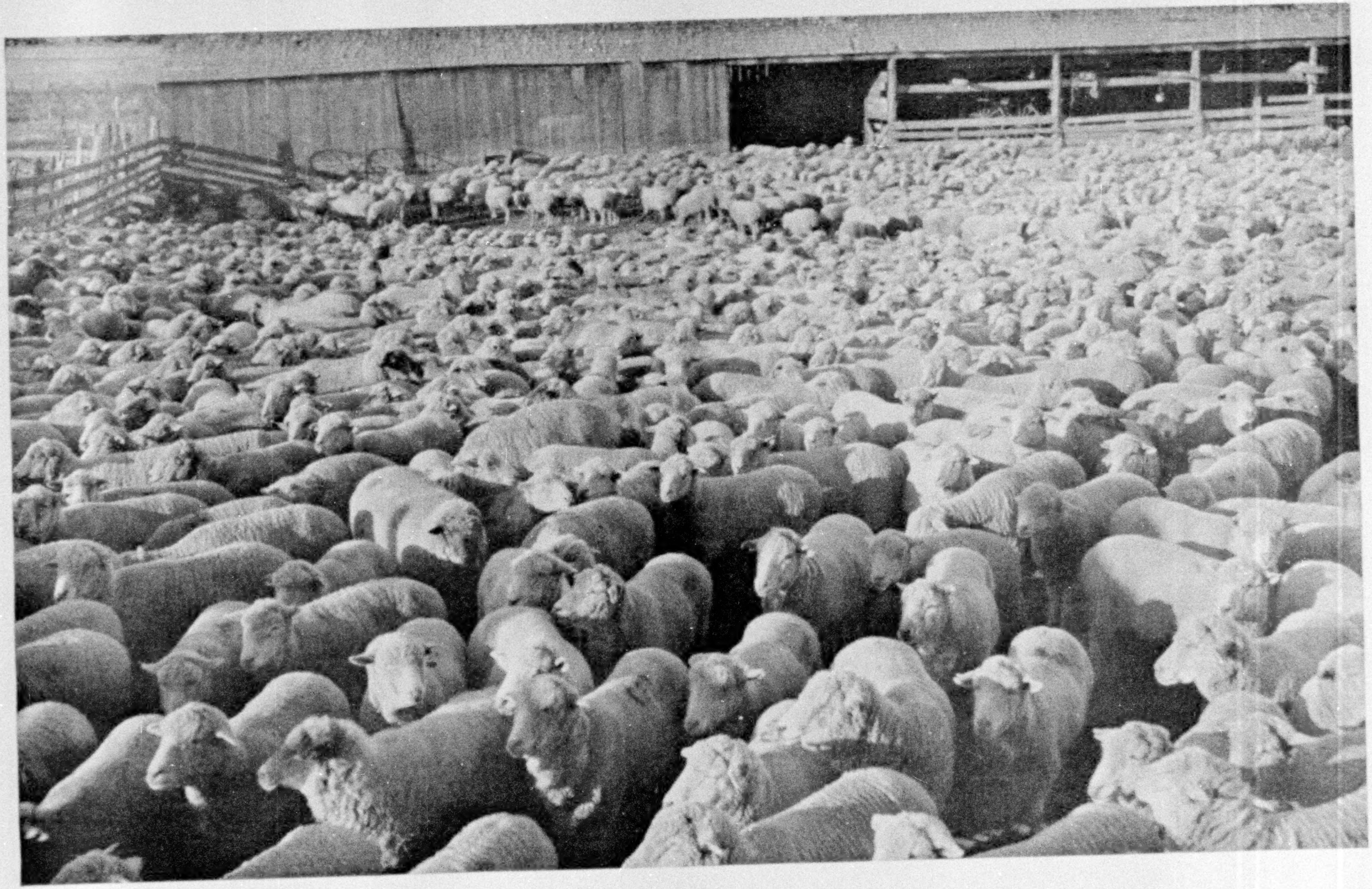
NEW PRODUCTS AVAILABLE

Not only are there vast millons of acres of potentially rich agricultural lands still awaiting development, and not only is it certain that the production per acre of those lands now under cultivation will be vastly increased, but new products are an inevitable prospect of the future.

When one travels in tropical countries he finds that banana flour makes an excellent substitute for wheat flour; and if the day ever comes when the wheat and the rye and the barley crops do not yield sufficient bread, there are hundreds of millions of acres of potential banana land which will produce many-fold as much banana flour to the acre as we are able to get today of wheat flour from our wheat lands.

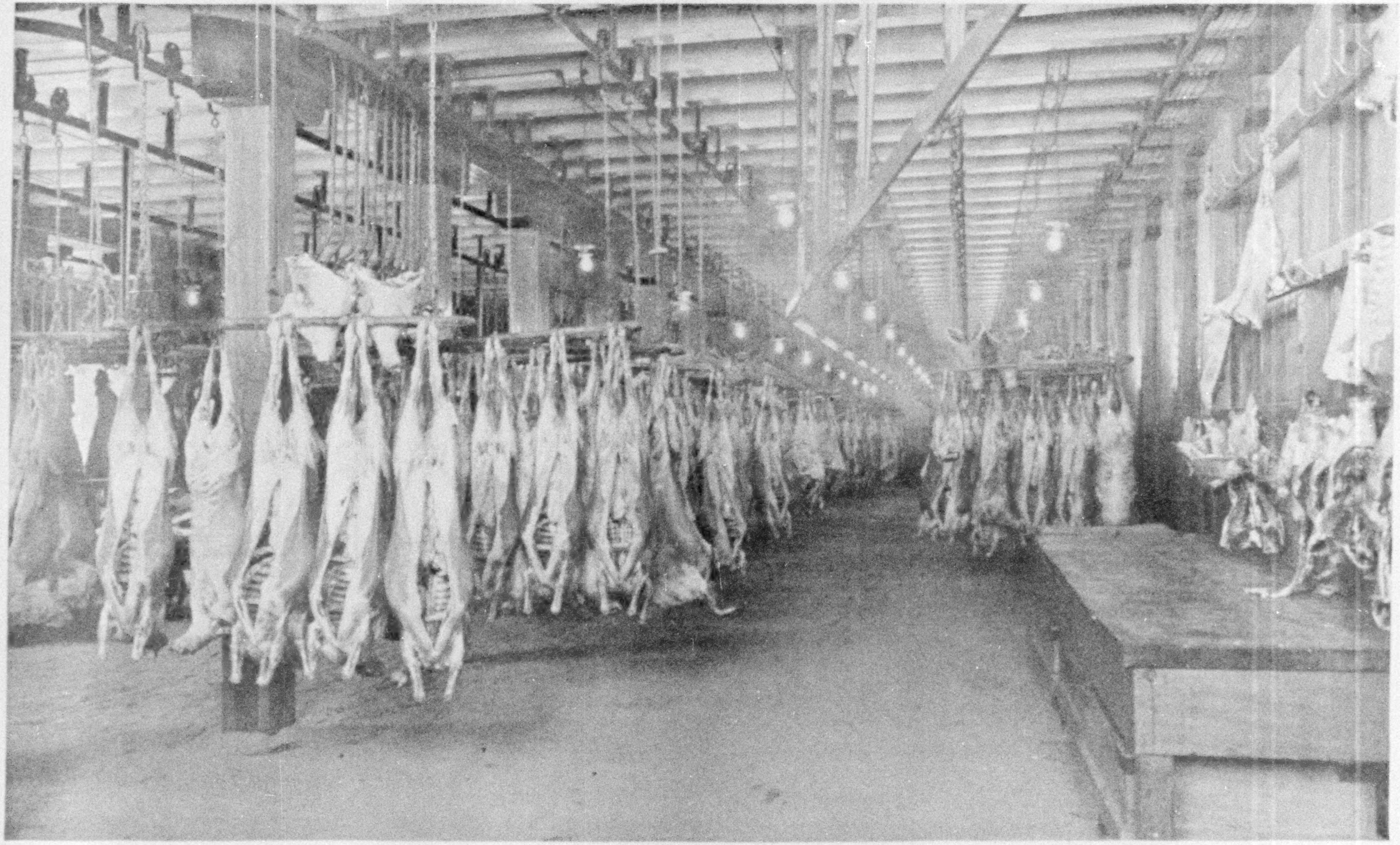
One might go on at length showing the wonderful possibilities of agriculture that lie in the future. Even if there should be no other developments than those which, by experience alone, we are able to forecast, there is no question but that the prospect of the world's starvation is to all practical purposes as remote as it was in the days of the pessimistic Malthus.

But just as the forecasts of Malthus failed to consider the possibilities of the age of agricultural machinery, the age



A TWENTIETH CENTURY SHEEPFOLD

Few other nations have as many domestic animals per capita as we have. There are 31 sheep for every hundred people in the world, 9 hogs, 25 cattle, and 6 horses. The United States has 50 sheep for every hundred people, 60 hogs, 58 cattle, and 24 horses.



Photograph from U. S. Department of Agriculture

SHEEP CARCASSES HANGING IN CHILLING ROOM, OR "COOLER"

"Cold storage is destined to play an increasingly important part in the handling of the world's food supply as the years go by and the demands for food increase. It is less than four decades since the first cargo of beef chilled by machinery instead of by ice was shipped, but today the funnels of refrigerator ships trace their lines of smoke upon every horizon" (see text, page 21).

Photograph by F. Lamson-Scribner

A FLOCK OF THOUSANDS OF SHEEP IN THE ARGENTINE REPUBLIC

The Argentine Republic is second only to Australia in the amount of mutton produced. It has 70 sheep to the square mile, where we have 17. It also exports more beef than any other country, having practically driven the United States out of the beef-exporting business. Where we exported 351,748,000 pounds of fresh meat in 1901, our exports in 1913 were only 7,362,000 pounds. On the other hand, Argentina's exports rose from 504,000 quarters in 1901 to 4,093,000 quarters in 1913.

Photograph by Frank H. Bothell

A FARMER LASSIE FEEDING HER COSSET

There are many little Marys and their lambs on American farms, and the lambs become as attached to their little mistresses as dogs do to their masters

of commercial fertilizer, and the age of preventive medicine as applied to live stock, so it is probable that the prophets who predict a hungry world in the not-distant future are failing to reckon with the possibilities of further extension and improvement of agricultural conditions.

Furthermore, they also entirely neglect the fact that synthetic chemistry is delving deeper into the mysteries of nature's laboratories in the roots and stalks of the plant world, and is gradually coming to the point where it can take the raw materials that the plant itself takes from the soil, and make foods in factories perhaps as well as nature makes them on the farm.

CONTINENTAL CHARACTERISTICS

In any study of how the world is fed, one discovers very soon that the various continents are characterized by widely varied forms of diet. Australia, smallest of continents, is the largest meat eater of them all. Asia, the largest continent, is the smallest meat eater among them. Africa and South America lean toward vegetarianism, while North America and Europe are large consumers of meat and other animal products.

Although Asia has fifty-three out of every hundred of the world's inhabitants living within its boundaries, it has, outside of India, comparatively few cattle, only a negligible number of hogs, and not a great many sheep. Fish, rice, and vegetables form the principal articles in the Asiatic market basket.

The average meal of the laboring class of China consists mainly of rice, a little cabbage boiled in a lot of water, and

A SHEPHERD ON THE PLAINS OF HORTOBAGY: HUNGARY

Photograph by A. W. Cutler

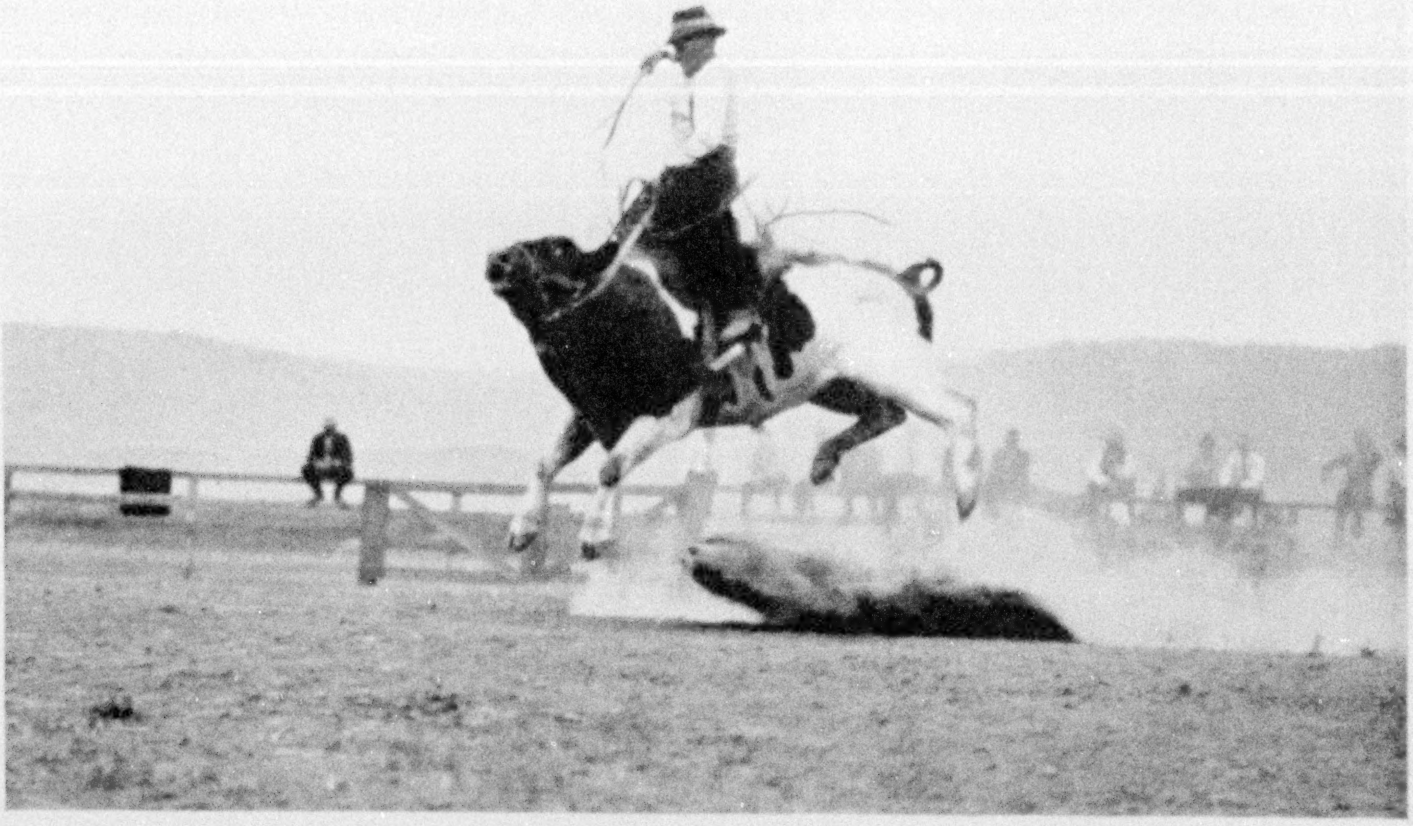
a small piece of turnip, pickled in brine, as a relish. From our standpoint, the Asiatic is a greatly underfed being, and yet wherever men are employed tribute is paid to the physical endurance of the Chinese coolie (see page 5).

The food of the 180,000,000 people who live in Africa is almost as simple as that of the Asiatics. It is largely vegetable, although roasted elephant foot is still one of the favorite dishes of the jungle dinner. South Africa eats largely as Europe eats, while the make-up of the North African market basket is almost identical with that of southwestern Asia.

It is probable that less than one-third of the earth's population gets what an American would call three square meals a day. Adding to the native population of Asia and Africa the Indians and half-breeds of South America, the aborigines of the islands of the sea and of Australia, and to them adding the underfed population of eastern Europe, we find that approximately 1,250,000,000 of the earth's population sit down to a scanty menu.

THE WORLD'S MEAT

Taking the world's supply of cattle, hogs, and sheep, and making proper allowance for the less improved methods of stock-raising on other parts of the globe as compared with those of the United States, it appears that mankind at



Photograph by Miller Photo Co.

ELIGIBLE FOR MEMBERSHIP IN THE ROUGH-RIDER REGIMENT

Bull-riding in Oregon is less brutal than bull-fighting in Mexico, but it is better sport, and the cowboy who herds our future beef supply is nothing if not a lover of good sport

large uses in the neighborhood of 47,000,000,000 pounds of meat a year. This would be an average of about 39 pounds per capita throughout the world. The people of the United States a few years ago were eating 172 pounds per capita, which is more than four times as much as the average for the race (see pages 10 and 15).

Next to the Australians, the American people are the largest of all meat eaters. In butchers' meat, the latest statistics showed the American to be eating 172 pounds, the Englishman 119 pounds, the German 113 pounds, the Frenchman and the Belgian 80 pounds, the Austro-Hungarian 64 pounds, the Russian 50 pounds, and the Spaniard 49 pounds. The average American eats 80½ pounds of beef, 7½ pounds of veal, 78 pounds of pork and lard, and 6½ pounds of mutton and lamb a year.

Where we eat 80 pounds of beef, the Englishman eats 56 pounds, the Frenchman 37 pounds, and the German 36 pounds. Where we eat 78 pounds of pork, including lard, the Englishman eats 33 pounds, the German 67 pounds, and the Frenchman 26 pounds.

We eat 7½ pounds of veal where the Englishman eats 4 pounds, the German 7½ pounds, and the Frenchman 8 pounds; and we eat 6½ pounds of mutton and lamb where the Englishman eats 26 pounds, the German 2½ pounds, and the Frenchman 9 pounds.

From these figures it will be seen that the Frenchman eats less than half the beef we do. He eats as much beef as the German, but less than half as much pork.

MEAT SUPPLY OF CENTRAL EUROPE

It is interesting to study the per capita production of meats in the countries of the Central Powers at the present time. The statistics of the United States Department of Agriculture reveal the fact that Germany, Austria-Hungary, Bulgaria, and Turkey had a total of approximately 50,000,000 cattle before the war began.

The Department of Agriculture says that about one-fifth of the total number of cattle in Germany are slaughtered an-

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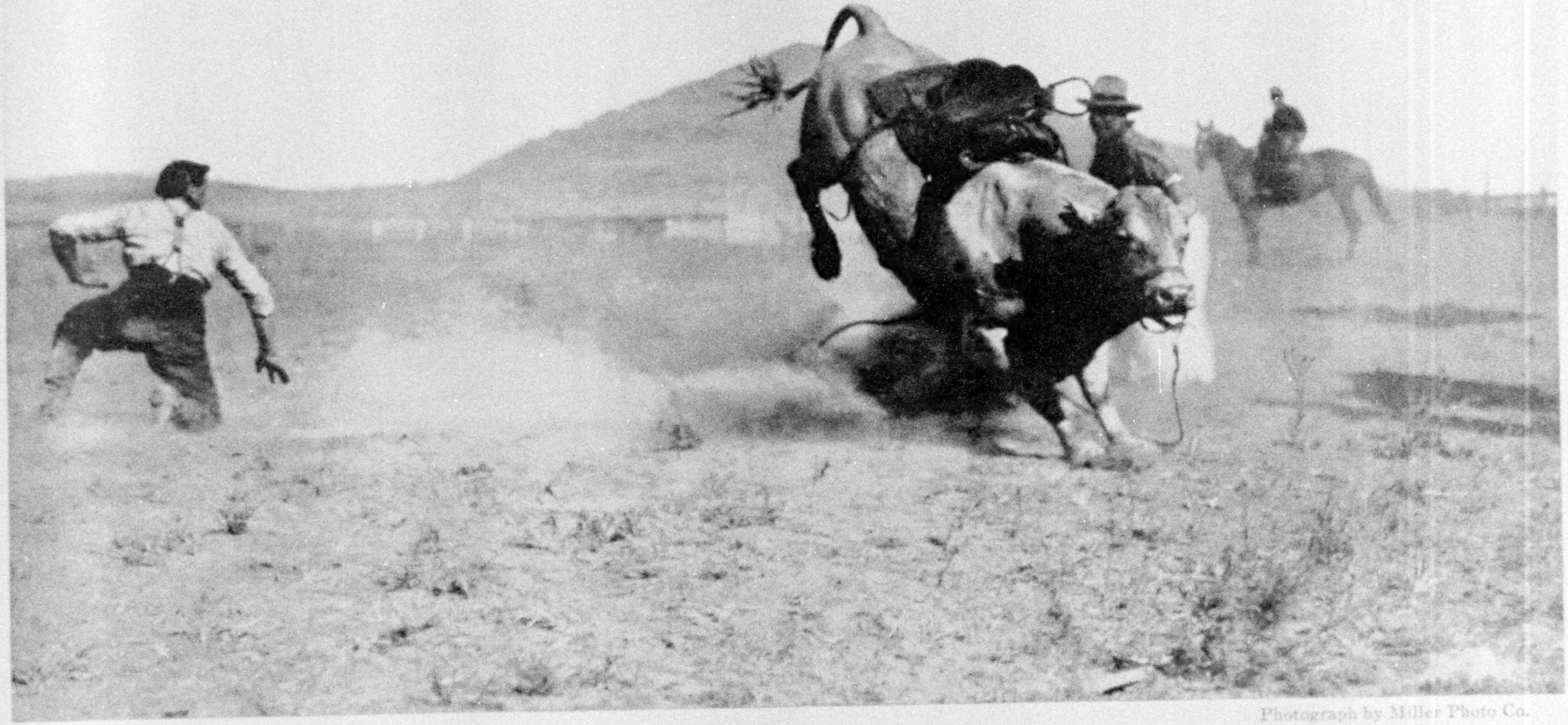
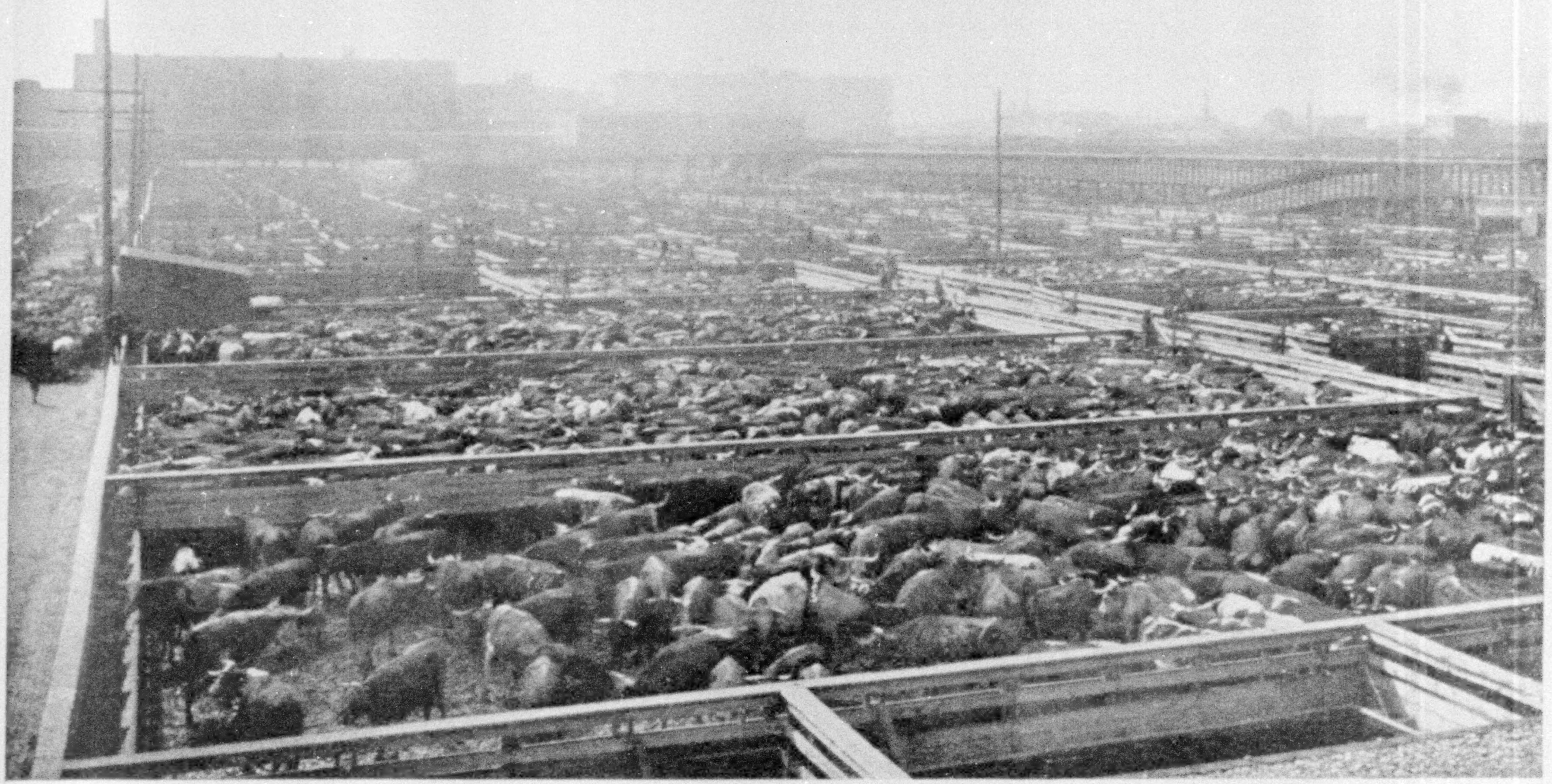


Photograph by Miller Photo Co.

THROWN BY A BUCKING BULL

We do not, like Nebuchadnezzar of old, have to eat grass ourselves, but we do eat it by proxy. We make the cattle of the ranches manufacture it into flesh for our benefit. Incidents like the one shown in the picture are the cowboy's antidote for the loneliness of the bounding plain.



Photograph from Union Stock Yards Co., Chicago

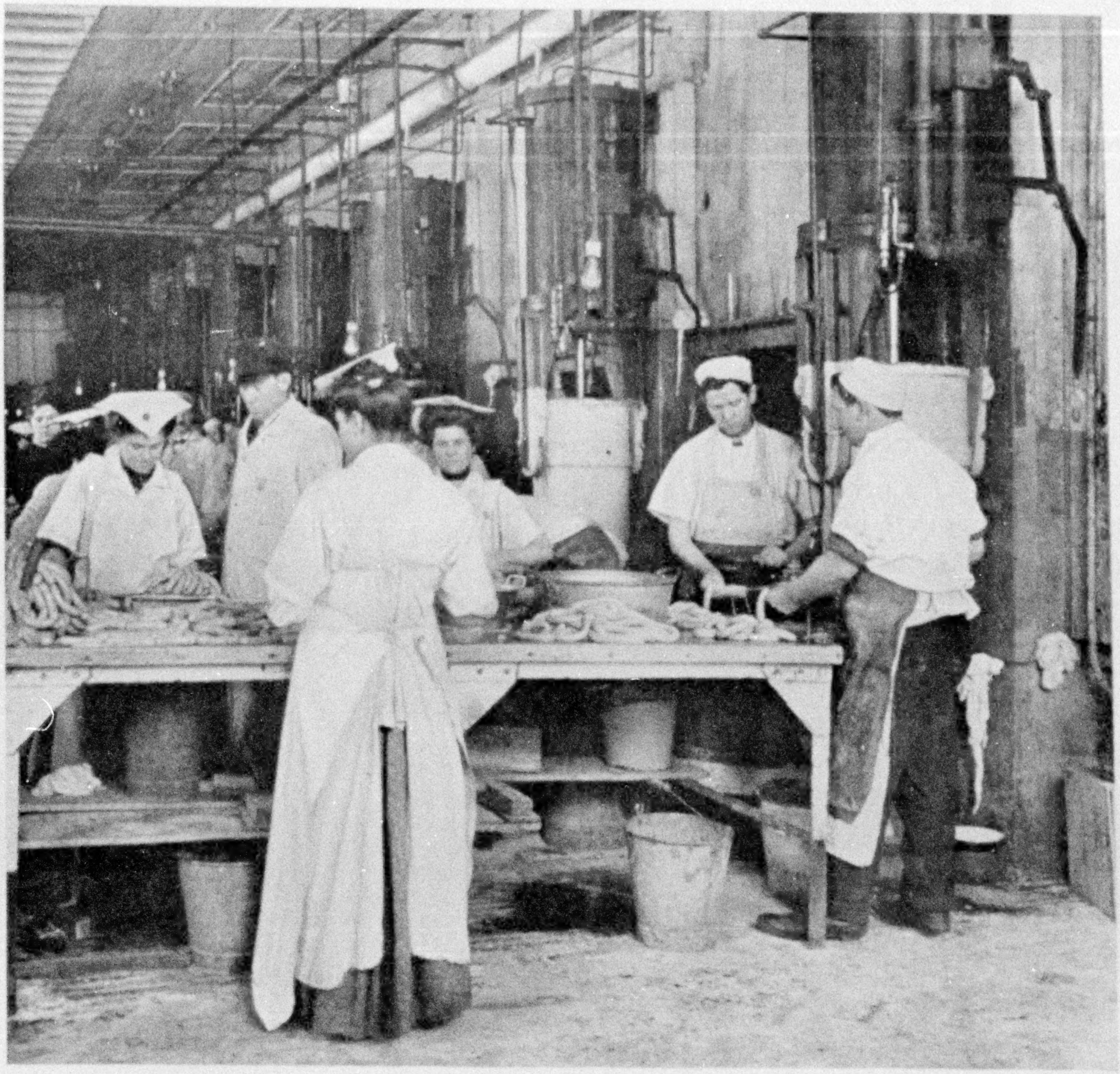
TYPICAL SCENE IN THE UNION STOCK YARDS, CHICAGO

There are about 200 cattle in the first pen in the foreground and probably several thousand in the area of the picture. The Union Stock Yards receive an average of about 7,000 cattle, 17,000 sheep, and 24,100 hogs every working day. The receipts of cattle for 1914 were 2,601,000, of sheep 5,378,000, and of hogs 6,618,000.

Photograph by Curtis & Miller

HOGS GROWN ON ALFALFA UNDER IRRIGATION: WASHINGTON STATE

The United States and Europe raise more hogs than all of the remainder of the world together. This is because of all domestic animals the hog is the least widely accepted. More than half the world still regards hog meat as unfit for human consumption.



Photograph from U. S. Department of Agriculture

STUFFING SAUSAGE IN A MODERN PACKING-HOUSE

The operatives in the sausage department have their nails manicured and their hands sterilized every time they come into the packing rooms. The factory output of sausage in the United States is worth $60,000,000 annually.

nually. Assuming that the net weight of those of Germany and Austria-Hungary corresponds with the net weight of our own cattle, and that the net weight of those of Bulgaria and Turkey is only 300 pounds where ours is 543, it would appear that there is a 34 pound per capita production of beef in the Central Powers.

There are 37,000,000 hogs in the countries of the Teutonic Alliance. The Department of Agriculture's statistics show that the annual slaughter in Germany is 110.4 per cent of the total number of hogs on hand at a given time; therefore it would appear that there is a per capita production of pork amounting to 45 pounds in the Central Powers. Based on the German ratio of the sheep killed to those found on the farms of the country at a given time, the annual slaughter of sheep in the region controlled by the Central Powers is 31,000,000.

Assuming that the average dressed weight per sheep is only 30 pounds, as compared with 41 pounds in the United States, there would be a production of 941,000,000 pounds of mutton, or 6.7 pounds per capita. This gives a total

Photograph from U. S. Department of Agriculture

INSPECTING SALT MEAT IN A BIG PACKING-HOUSE

While salt meat represents only a comparatively small share of the meat production of the United States, yet, neglecting the farm slaughter and that of the retail butcher, we produce 9½ pounds of salt pork, 8 pounds of ham, 3½ pounds of shoulder, and 7½ pounds of side meat per capita.

production of meat, omitting horse and goat meat, of 85.7 pounds per capita among the Central Powers. The Department of Agriculture gives the average German consumption as 113 pounds, and the average Austria-Hungarian consumption as 64 pounds. It is probable that Bulgarian and Turkish consumption approximates that of the Russian, which is 50 pounds.

WE ARE EATING LESS MEAT

In the past few years the United States has shown a tendency to reduce the volume of meat it consumes per capita. The high cost of butchers' meats has forced Americans to find substitutes, and it is not improbable that in the course of another generation meat eating in this country will fall far below the mark it has hitherto held.

Not only has our home consumption of meat fallen off, but our exports of animal products have declined immensely in ten years. If it were not for our enormous exports of lard, we would be in danger of having our foreign meat trade become a negligible quantity.

But in spite of the slowing up of per capita home consumption and of our declining meat export trade, the meat-packing industry today still takes first rank among all the manufacturing industries of the United States in the value of its products. Under the 1910 census the products of the meat-packing industry were valued at $1,370,000,000, as compared with $1,228,000,000 for foundry and machine-shop products, their closest rival (see pages 18 and 20).

More than 100,000 people are engaged in the slaughtering and meat-packing industry. During a recent year the on-the-hoof production of meats on the American farm was: 8,265,000,000 pounds of beef, 409,000,000 pounds of veal, 987,000,000 pounds of mutton and lamb, and 6,856,000,000 pounds of pork.

THE IMPORTANCE OF LARD

Lard is one of the principal items of animal products exported from the United States today. Our total production of this commodity annually amounts to approximately 1,500,000,000 pounds, of which more than 500,000,000 pounds go to other countries. Germany heretofore has taken the bulk of the lard we have exported, and the cutting off of this supply has been one of the hardships the Central Powers have had to face (see pages 21 and 22).

We use more than 10 pounds per capita in the United States, and it is generally believed that the German demand for this product is larger per capita than our own. If the 41,000,000 hogs slaughtered within the confines of the Central Powers annually produce as much lard per animal as ours, the per capita supply of the Central Powers will approximate a little less than 8 pounds.

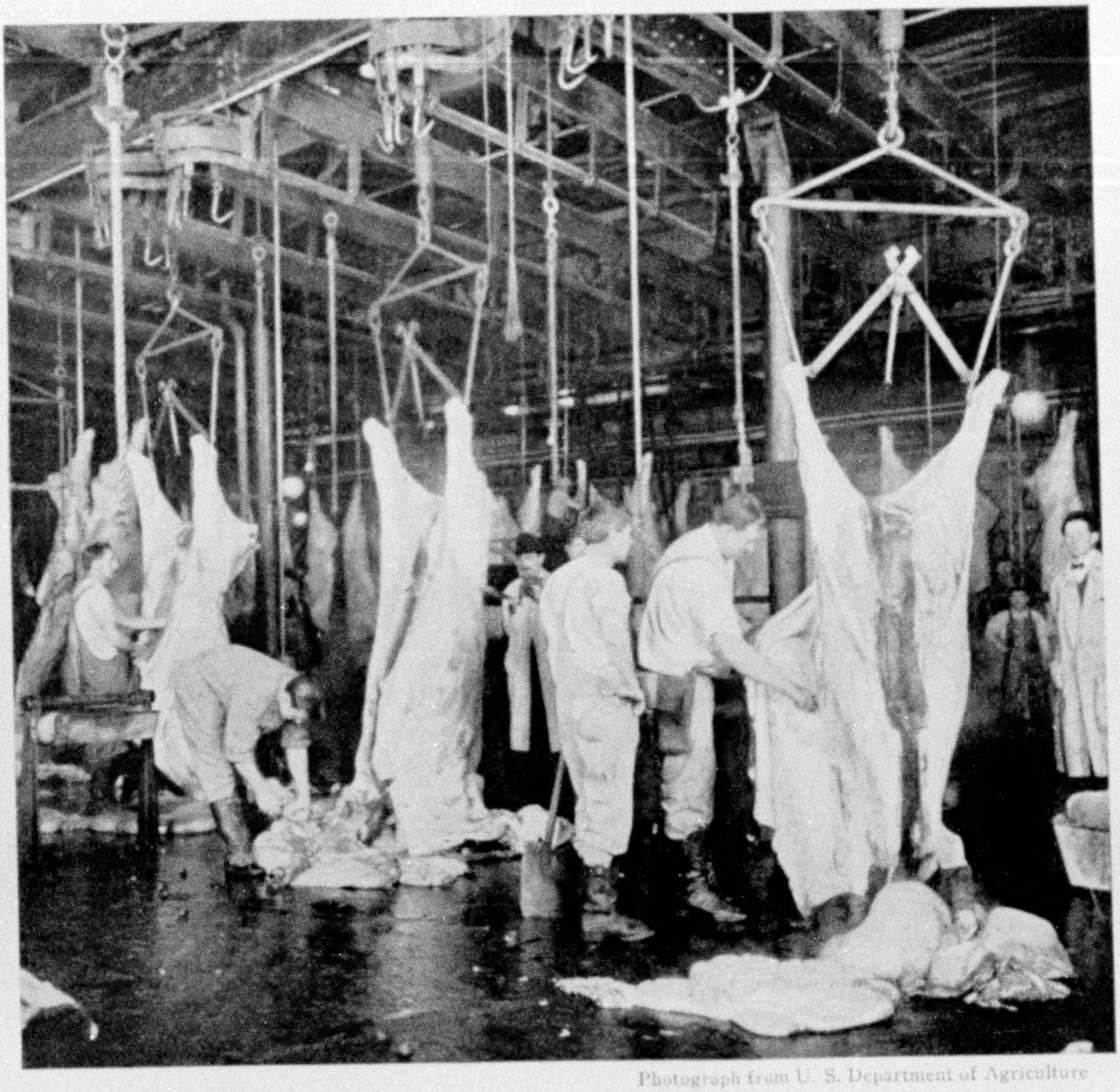
While many substitutes for lard have been found, among them cotton-seed oil and olive oil, there is no prospect that the world will ever be able to do without a very large supply of this product of the hog. The necessity of some fat or oil in the human diet is borne witness to no less by the experts in dietetics than by the universality of the use of fats and oils in cooking throughout the world.

One cannot go far enough afield—even in the remotest corners of the earth—to get beyond the reign of vegetable oils and animal fats in the human dietary. Fats are the greatest of all of the heat and energy producers with which nature provides mankind. The man fed on a diet from which all fats and oils are excluded very soon has serious disturbances of his digestive processes.

THE EVOLUTION OF THE PACKING-HOUSE

The meat-packing business is the development of the present generation. Where once there were slaughter-houses in every community, and the business of slaughtering live stock for food was widely scattered, today the industry is narrowly concentrated, and a half dozen packing towns do perhaps three-fourths of all of the butchering business of the country.

When Gustavus Swift first conceived the idea of doing the butchering near the centers of animal production and shipping the dressed meat to the centers of consumption, he saved to the American consumer one of the heaviest freight bills



Photograph from U. S. Department of Agriculture

INSPECTING VISCERA OF CATTLE CARCASSES

the nation was paying. Not only did he save the difference between the live weight of the stock slaughtered and the dressed weight, but he was able to put more tons of dressed beef into a car than he could of cattle.

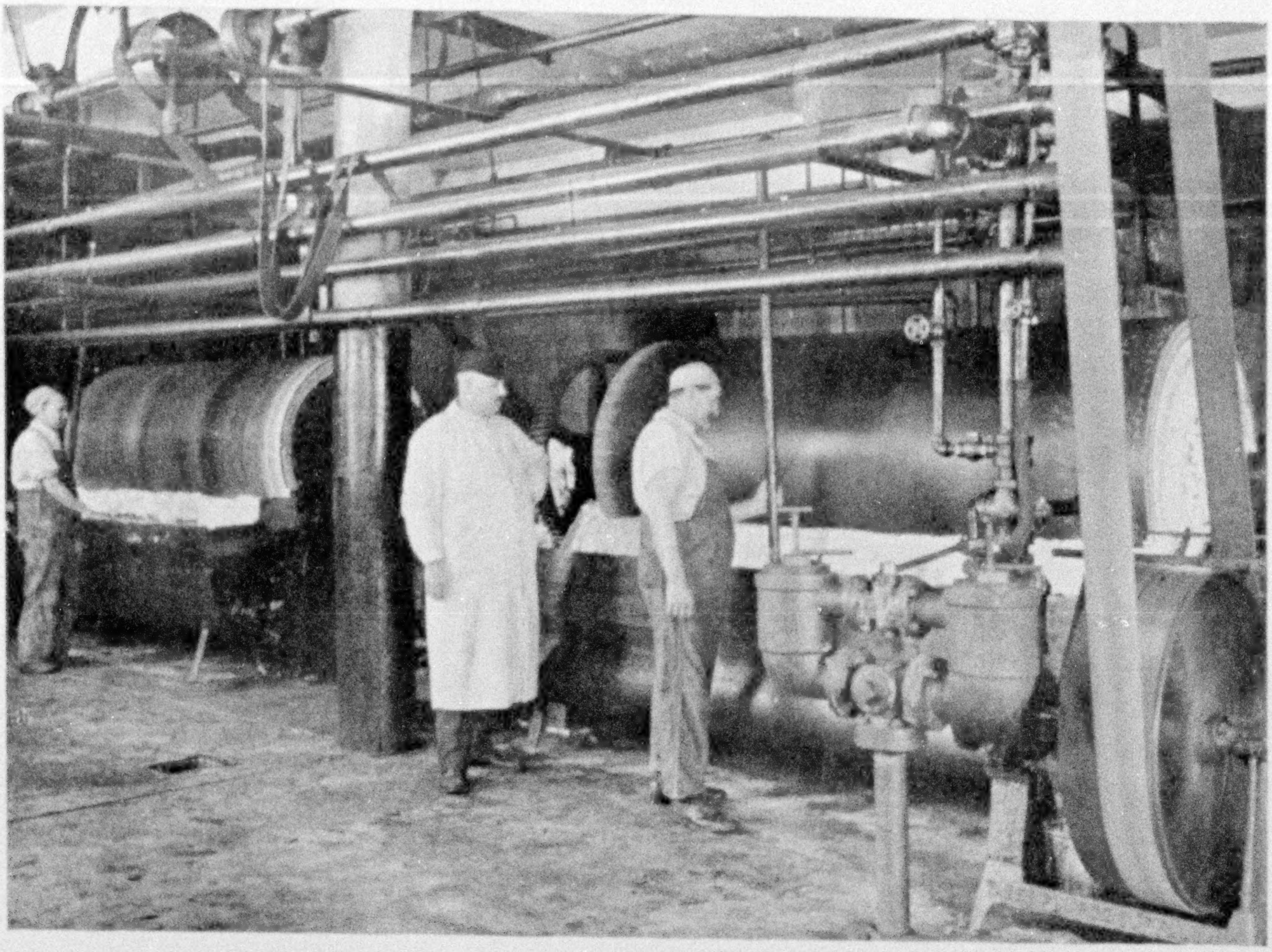
The packing business was first built up on the saving in freight. Later the use of the ordinary wastages of the slaughtering business in the manufacture of by-products effected other savings as remarkable as those on freight.

PRICE DISPARITIES

The question of the disproportion between the prices of cattle on the hoof and those of roasts and steaks is by no means a new one. Away back in 1858 people were asking how it happened that roasts and steaks were selling at 15½ cents when cattle on the hoof were bringing less than 7 cents.

It seems strange in these days to think of buying best rib roasts and porterhouse steaks at 15½ cents a pound, and yet in that year the American Agriculturist took a heavy steer through the market from the slaughter-house to the retail customer, tracing the profits derived therefrom, and found that it could be done and still leave a profit of more than five dollars per carcass to the butcher.

In those days, before the packing-town idea was evolved, there was a margin of nearly 5 cents between the price of beef on the hoof and the dressed carcass;



Photograph from U. S. Department of Agriculture

RENDERING LARD IN A CHICAGO PACKING-HOUSE

Ask your cook what dishes she would be able to prepare for you if she had no lard, butter, nor oil

under the economies that have been effected through the packing-house idea the margin is approximately only half as much. What the prices for our steaks and roasts would be if the margin of price between meat on the hoof and meat in cold storage were as great as it used to be, one can only surmise!

THE RISE OF REFRIGERATION

How one step in the progress of catering to the world's food demands makes another possible is nowhere better shown than in the case of the packing industry. When that humble citizen of Florida, John Gorrie, invented the ice-making machine, he not only enabled the whole world to know the delights of a plentiful supply of cold water, but he also made it possible to exchange its perishable products, so that the tropics might give to the temperate zone their fruits, and the temperate zone might send to the tropics their excellent corn-fed meats and other cold-storage foods.

Once there were entire nations where only the favored few ever knew the refreshing experience of a cold drink, and it always happened that these nations were situated in those regions where a cold drink means most to humanity. The ice factory, which has meant so much to us in its relation to our own food supply, has brought the delights of ice-cream and soda water to those hundreds of millions of people who live between Capricorn and Cancer, the while it has given them Chicago, Omaha, Kansas City, and St. Joseph meats.

Cold storage is destined to play an increasingly important part in the handling of the world's food supply as the years go by and the demands for food increase. It is less than four decades since the first cargo of beef chilled by machinery instead of by ice was shipped, but today the funnels of refrigerator ships trace their lines of smoke upon every horizon.

Any one who has lived on a farm and has seen the amount of wastage there is

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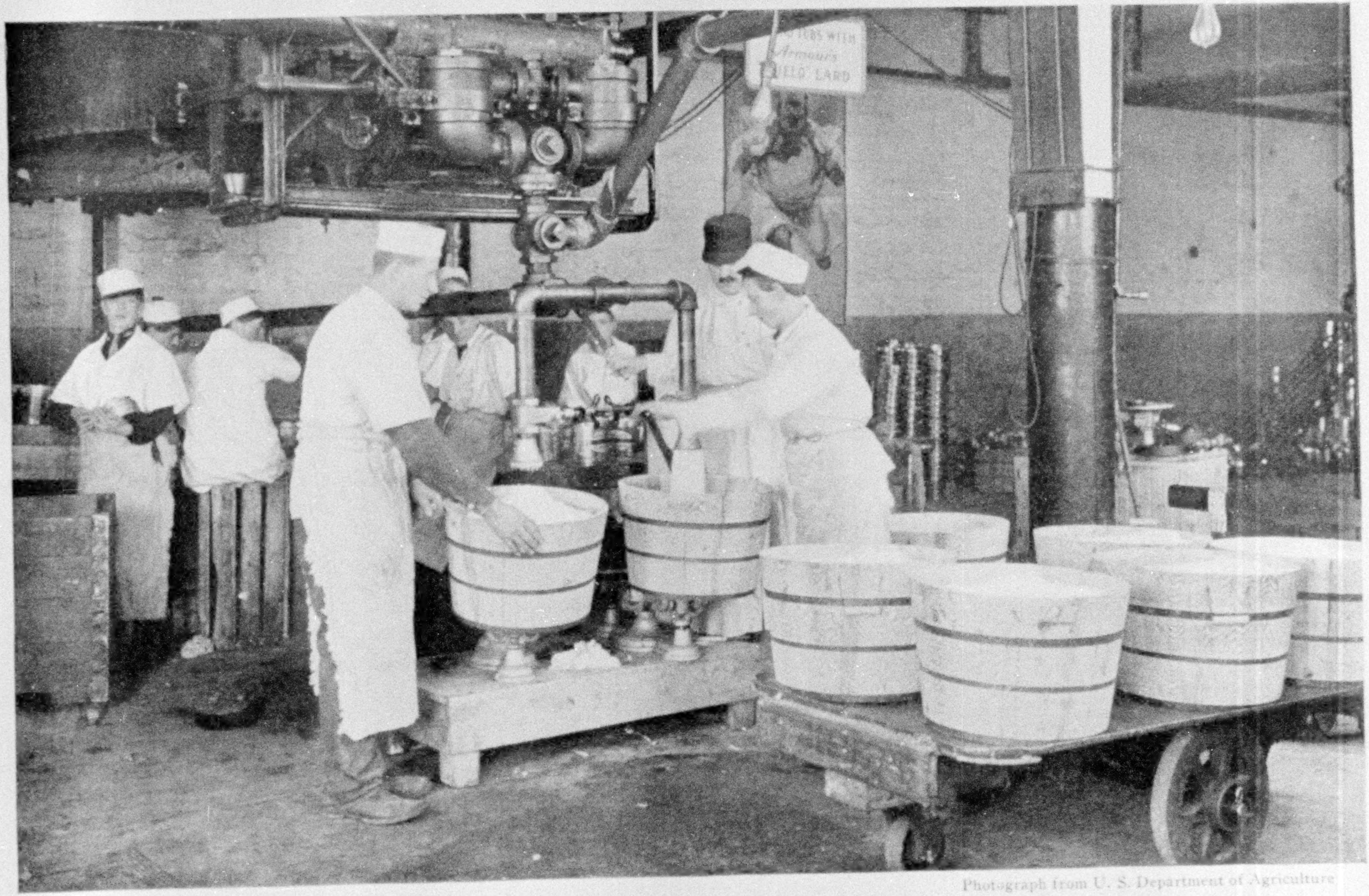

Photograph from U. S. Department of Agriculture

FILLING TUBS WITH PURE LARD

There are a number of grades of lard. Leaf lard is made of the fat surrounding the intestines and kidneys. Other grades are made from other fats, being reduced to a liquid grease by steam heat and then drawn off into tubs, as shown in the picture.

in the vegetable garden and the truck patch by reason of a lack of facilities for taking care of the surplus, will readily understand what a saving there could be if a cold-storage plant were convenient. Gradually these plants are coming closer and closer to the farmer, many of whom already are making use of them to store their perishable products, like fruits, vegetables, and eggs, until the higher prices of the winter months set in.

THE FISH SUPPLY

As the world fills up with people, the more humanity is bound to look to the sea for food, and a rich field will there be found. Already the United States has a fisheries industry the value of whose product nearly offsets the value of the product of its wonderful apple orchards. Our fisheries yield a return of $70,000,000 a year, which almost exactly duplicates the returns the United Kingdom receives from her fishing industry. France's annual catch reaches a value of $33,000,000, while that of Russia amounts to $50,000,000. Austria - Hungary and Germany together have a total catch of only $12,000,000 value (see pages 26-27).

It has been conservatively estimated that the world's fish supply exceeds twenty billion pounds. Japan's fisheries produce about six billion pounds a year. What our western grazing lands have been to our meat supply, that has the sea been to Japan's.

A census of the sea would reveal more animal life to the square mile, perhaps, than the land itself possesses. There are all sorts and shapes and varieties of aquatic life to be found, and the rich treasures of food which the rivers of the earth carry down to the oceans defy measure.

Gradually new fishing grounds are being opened up and new varieties of fish introduced to the public. Just now the efforts of the United States Bureau of Fisheries to restore the tile-fish to the American dinner table, and its plans for a campaign of education in favor of the edibility of the dogfish, are straws which show the direction of the wind in the utilization of the vast food treasures of the sea.

CHINESE GREAT FISH EATERS

The Chinese are among the greatest fish eaters of the world, and they have accepted so many varieties in their list of edible fishes that they can have a different kind for breakfast every morning in the year. Not only are their seas filled with fish, but their rivers as well, and while no other nation has gone as far as the United States in scientific fish propagation in fresh waters, the Chinese have cared for their fish supply through a hundred generations.

All sorts of methods for catching fish have been developed by the nations of the earth. It is a far cry from the big steam trawler of the North Sea to the hook and line of the small boy on a country creek bank. But most picturesque of all the ways of fishing in the world is that resorted to by the Chinese—fishing with cormorants. The cormorants are hatched under chicken hens, and when about three months old are taught to fish.

The trainer ties a string to one of the bird's legs and drives it into the water. He then throws out some small fish which the bird promptly catches. It is taught to dive and come back at the call of a whistle. When trained, collars are put about the bird's neck, so that it cannot swallow the fish it catches. A fisherman goes out with the rail of his boat lined with string-hitched cormorants. At a given signal they dive, and the fish that can outswim them under water is as rare as a small fish in an angler's description of his catch.

THE CEREAL CROPS

That the vegetable kingdom has more to offer the world's market basket than the animal world is revealed by a comparison of the animal products and the vegetable products of the food factories of the United States—the greatest animal-food producing country on the globe.

Although a smaller portion of the vegetable products of the country passed through factory processes than of the meat products, the vegetable manufacturing processes employed, at the last census, 292,000 people and turned out a product valued at $2,237,000,000, while

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the animal product factories employed 119,000 people and yielded an output valued at $1,700,000,000.

The total products of the farms of the United States that year amounted to more than all the gold mines of the world have yielded in six centuries (see page 32).

BUMPER CROPS AND PRICES

The world's normal yield of the six great cereal crops—oats, wheat, corn, rye, barley, and rice—ranges between sixteen billion and nineteen billion bushels, and statistics show that the farmer gets less ordinarily for his big crop than he receives for his small one.

Excluding rice, we find that the 1911 cereal crop amounted to 13,786,000,000 bushels. The average value per bushel, based on the average farm price for the United States on December 1, was 72.9 cents, giving a total crop value of $10,030,000,000. The crop of 1912 was the bumper crop of the world's history, reaching a total of 16,115,000,000 bushels. The average farm price on December 1, 1912, in the United States, was 54.7 cents per bushel, showing a world crop value of $9,814,000,000.

In other words, the farmers of the world handled 2,329,000,000 bushels more of grain in 1912 than in 1911, and yet they got $1,216,000,000 less for the big crop than for the small one.

The same condition is shown in a comparison of the statistics for 1906 and 1907. Although the world's farmers produced three-quarters of a billion bushels of grain less in the latter year than in the former, they received nearly two billion dollars less for the large crop of 1906 than for the small one of 1907.

THE WORLD'S WHEAT CROP

Though man shall not live by bread alone, western civilization would find it very difficult to get along without wheat and its products. Although the wheat plant is not of western origin, it has become mainly a western product, marching hand in hand with western civilization. The world's total production of wheat approximates 4,000,000,000 bushels a year. It would take 4,000,000 of the largest freight cars, making a train reaching more than one and one-half times around the earth, to move this great annual yield. Moving at twenty miles an hour, this train would take thirty-odd days to pass a given point.

The wheat crop of the United States is approximately one-fifth of that of the entire world. It would seem that, with the development of the northwestern part of this country, wheat had at last reached its limit of cultivation on American soil; but those who have studied the question most closely tell us that the wheat-growing industry has heretofore simply followed the lines of least resistance, picking out here and there the lands best suited for wheat growing; and that since all the choicest land has been opened up, the wheat growers will gradually drift back and take up the less available lands that they passed over in looking for the best (see page 34).

Not only will the trend of the wheat field be east and south, but it is certain to reach farther and farther into what is now the semi-arid regions of the West. Between its extension into the desert through irrigation and its advance into the semi-desert through the introduction of hardy, drought-resisting varieties, America is afar off from the time when the potential acreage and yield of her wheat fields is reached.

It is estimated that it will be easily possible for the United States to double its wheat-growing area. That would give us an average which, when we approximate western European standards in wheat growing, will yield very nearly as much wheat as the whole world produces today.

It has been strikingly said that he who can add a grain of wheat to each head in the world's wheat fields can give bread to millions of people, and when the United States extends her acreage to its maximum and develops the yield to its limit, nations yet unborn can rise up and secure bread from her flour bins.

RUSSIA'S WHEAT FIELDS

But as full of possibilities as the wheat-growing industry of the United States may be, they are few in comparison with

Photograph by Curtis & Miller

A FAIR "FISHERMAN": WASHINGTON STATE

"As the world fills up with people, the more it is bound to look to the sea for food, and a rich field will there be found" (see text, page 23)

those of Russia. That wonderful country, possessing more latent agricultural resources, perhaps, than any like area in the world, has 288,000,000 acres of excellent wheat land. Even at our present standard of production, which is less than half of that of western Europe, Russia alone could produce more wheat than is raised on the entire globe today.

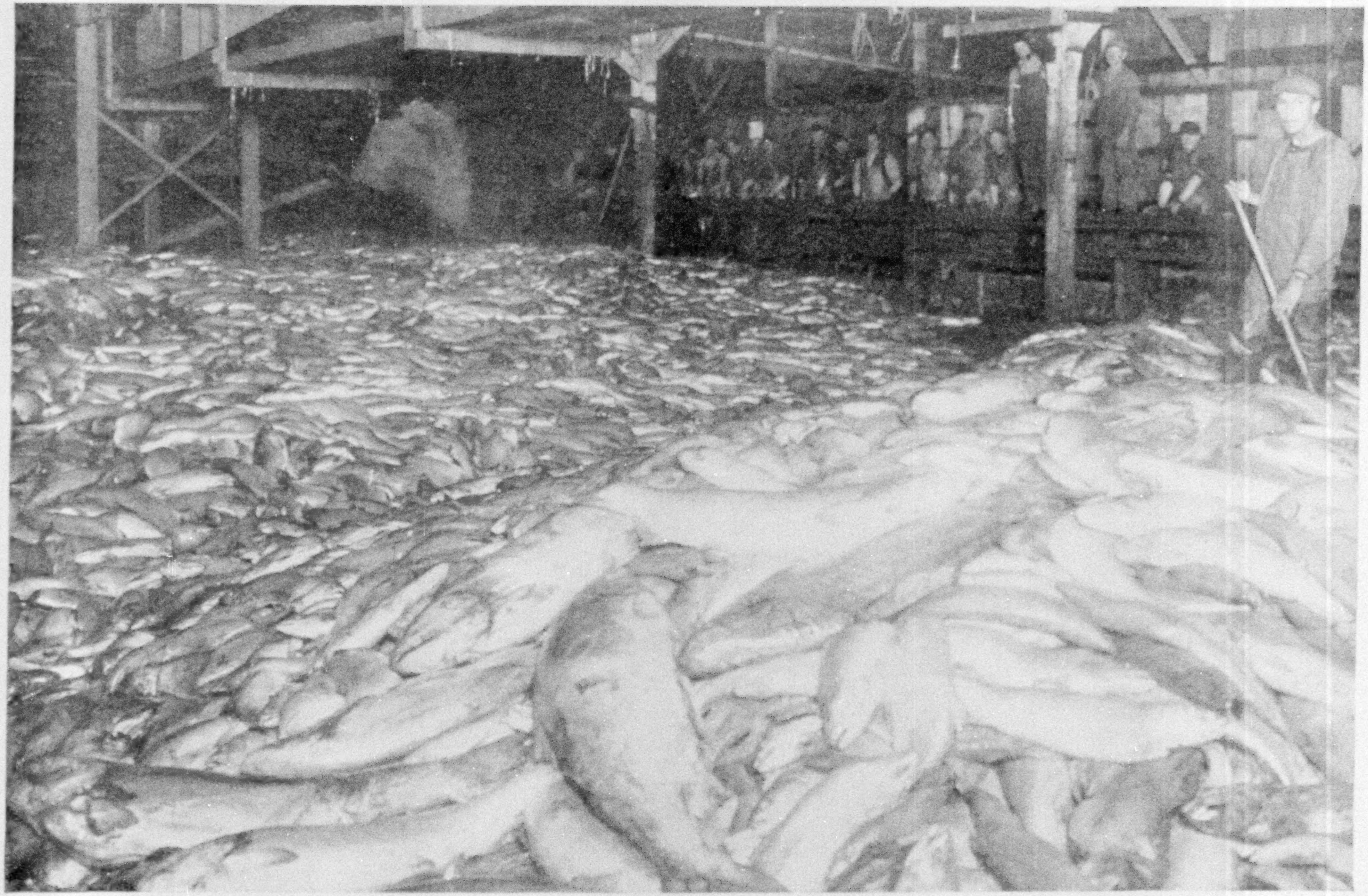
As matters now stand, the Russian crop is only about ten bushels per acre. That her lands are as fertile and her climate as well suited to the growing of wheat as those of England and Germany are facts well known to all those who have considered her relations to the world's future food problems. Even today, in spite of her small per-acre production of every principal crop, Russia is the greatest exporter of grain in the world.

We ordinarily think of the exportation and importation of food products as being one of the most important considerations in relation to production. The world's prices for these commodities are

Photograph by Curtis & Miller

FROZEN HALIBUT: WASHINGTON STATE

Japan is showing the world how it is possible to get along with a very small butchers' meat supply. Its annual fish catch is rated at six billion pounds, which represents a greater weight than the dressed weight of all our beef, veal, mutton, and lamb. The Japanese virtually have come to look to the sea for their meat supply.



Photograph by Curtis & Miller

A WAREHOUSE FULL OF SALMON READY TO CAN

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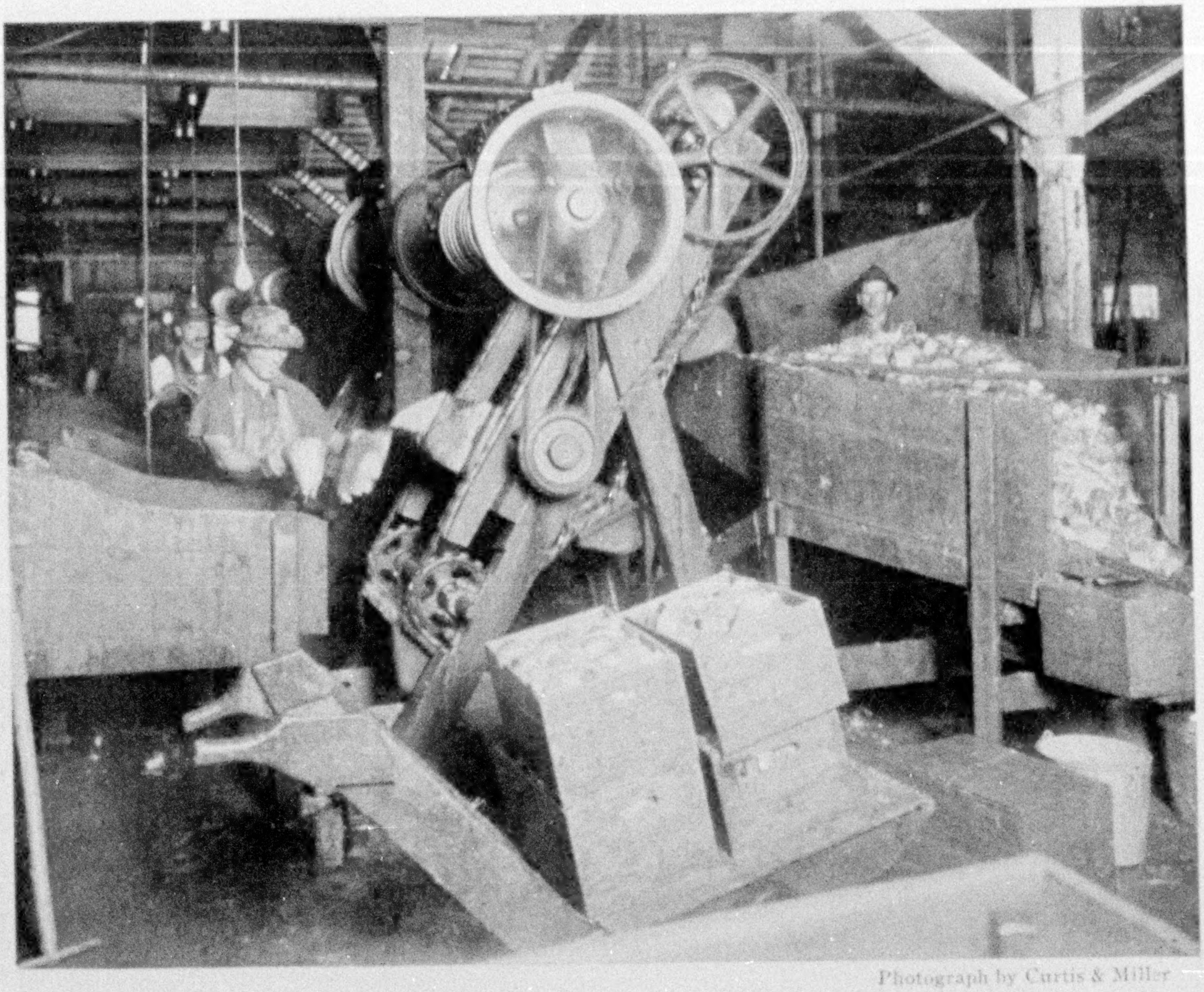

Photograph by Curtis & Miller

CUTTING SALMON FOR THE CANS

The salmon are fed into the "iron chink," which automatically removes the head, fins, and viscera; after that it goes to the cutting machine, which prepares it for the can

fixed by the prices received for that portion of the product moving in international trade. And yet it is quite a good bit a case of the tail wagging the dog, as will be seen from the figures in relation to wheat. Out of 4,000,000,000 bushels of wheat raised in the world, only 600,000,000 get out into the channels of international trade.

THE ORIGIN OF WHEAT

The growing of wheat has so long been a principal occupation with man that its geographical origin is unknown. The Egyptians claim it originated with Isis, while the Chinese claim to have received the seed direct as a gift from heaven. The belief that it originated in the valleys of the Euphrates and the Tigris is more generally accepted than any other. The most ancient languages mention wheat, and it has been found by the archeologists in the kitchens of the prehistoric inhabitants of the Swiss Lake region. It is generally agreed that, at the lowest estimate, wheat has been a faithful servant of mankind for six thousand years.

A glance at the statistics of bread consumption shows that as meat consumption goes down that of bread rises up. The people of the United States consume 295 pounds per capita of wheat and rye per year, those of England 356 pounds, those of Germany 525 pounds, and those of France 550 pounds, which is in every case in inverse ratio to their consumption of meat.

According to available statistics, the Central Powers of Europe produced 501,000,000 bushels of wheat in 1913. This would give them a per capita production of 215 pounds. Their total production of rye amounted in the same year to 654,000,000 bushels, or 261 pounds per capita.

Photograph by Curtis & Miller

FILLING CANS BY MACHINERY

Twenty million cases of canned salmon are filled annually in Alaska

It will be seen from this that the per capita production of wheat and rye in the Central Powers is about 467 pounds, while Germany's consumption is placed at 525 pounds in normal times. It is probable that the per capita consumption is even greater in Austria-Hungary, Bulgaria, and Turkey than in Germany.

CORN AS HUMAN FOOD

While a thorough appreciation of hoecake and corn-pone is largely limited to our own Dixie, and while corn is mainly a stock food, still it occupies no inconspicuous place in the world's market basket, as any one who takes the time to examine consumption figures will find. The grist mills of the United States in 1909 produced 27,000,000 bushels of cornmeal and corn flour, and 837,000,000 pounds of hominy and grits, while the canning factories canned 168,000,000 cans of corn.

It is said that Mexico's production of corn is worth more, in normal times, than her production of gold, and although the Mexican mines are world famous for the prodigality of their yield, any one who has seen at first-hand the universal sway of the tortilla can well believe that the Mexican cornfield outranks the Mexican gold mine.

Today the United States produces two-thirds of the world's supply of corn. It devotes a little more than twice as much acreage to that crop as it does to wheat. Our average yield is 23.1 bushels to the acre (see page 32).

There is no place better suited to demonstrate the possibilities of scientific agriculture than in the handling of the nation's corn crop. If we were to take the average yields of all the boys' corn-growing clubs of the United States, we would probably find them ranging around eighty bushels to the acre. This would give a total yield, on the basis of the present

Photograph from U. S. Department of Agriculture

BEEF BALED LIKE HAY OR COTTON

All edible scrap meat in the packing-house is baled together and packed away in a freezing room to await conversion into potted beef and other similar products. Note the ice on the pipes.

acreage under cultivation in the United States, two and one-third times as large as that of the entire world today (see pages 101 and 105).

It is certainly not unreasonable to believe that the average farmer of the United States in future years will do as well as the average boy of the corn club today. When we remember that the youthful enthusiasts of the corn clubs of today will be the farmers of tomorrow, it probably is not too much to hope that the time is less than a generation distant when the United States can add billions of bushels of corn to the needs of a growing race.

It is fitting that the Americas should produce approximately three-fourths of the world's corn, for corn is a true American. It was here when Columbus came to the New World, and the early colonists left a record of the fact that they learned the lesson of its use from the red men.

BARLEY AND RYE

We who have spent all of our lives in the United States have little realization of the important part barley and rye play in the market baskets of many countries, for beyond a little barley broth and an occasional loaf of rye bread, the American does not often meet these cereals at meal time. Yet in Russia, in southeastern Europe, and in parts of Asia barley and rye meal are the raw material of the bread of the masses. The barley and rye crops of the earth together would fill more than two million freight cars, enough to more than belt the earth at the Equator.

In Japan, when the people get too poor to eat rice they resort to barley, and it is said that there is a social distinction drawn between the rice-eating and the barley-eating natives. Barley formerly was more frequently used in western Europe than it is today; it was the cereal from which the goose pie was made in the early days of England.

In bulk, oats is the greatest of all the cereal crops of the world, though in weight it is surpassed by several others. It was Doctor Johnson, I believe, who said that they fed oats to horses in England and to men in Scotland. The retort was that Scotland was famous for its men and England for its horses. Though oats figure mainly in the world's diet as a breakfast food, still the total used as human food is an important one.

Photograph by A. W. Cutler

"TWO'S COMPANY"; INCIDENTALLY A WHEAT-FIELD COURTSHIP

ASIA THE HOME OF RICE

Although the United States produces more than 700,000,000 pounds of rice, this is but a drop in the bucket as compared with the production of Asia. That continent, although making a remarkably poor showing in its production of live stock and those cereals which we most extensively grow, has almost a monopoly of the production of rice. Out of the total world's production of 162,000,000,000 pounds, it grows 159,000,000,000. Perhaps nine-tenths of all the rice eaten in the world is eaten by the Asiatics. To the great masses of Asia's unnumbered millions it is largely both bread and meat (see page 38).

The rice crop must be grown in water, the fields being kept flooded the greater part of the time until it matures. This necessitates a system of canals or other means of irrigation. In many parts of China and Japan the coolie laborers are always kept busy pumping water for the rice fields. In some cases they raise the water by hand from one level to another by buckets; in others, primitive water-wheels are equipped with treading-boards, so that the men can turn the wheels with their feet; still other wheels are turned by animal power (see page 39).

In the Philippines, Java, and parts of southern Asia thousands of water buffaloes are used to drag the plows and harrows through the mud in preparing the seed bed for the crop. In the chief rice-raising countries the harvest time is an important event. At the beginning the natives often have picnics; in Java, they erect little temples, about the size of a pigeon-house, containing an offering of

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Photograph from U. S. Department of Agriculture

A TWENTIETH CENTURY CORNFIELD

"There is no place better suited to demonstrate the possibilities of scientific agriculture than in the handling of the nation's corn crop. If we were to take the average yield of all the boys' corn-growing clubs of the United States, we would probably find it ranging around eighty bushels to the acre. This would give a total yield, on the basis of the present acreage under cultivation in the United States, two and one-third times as large as that of the entire world today" (see text, page 29).

Photograph from A. W. Thompson

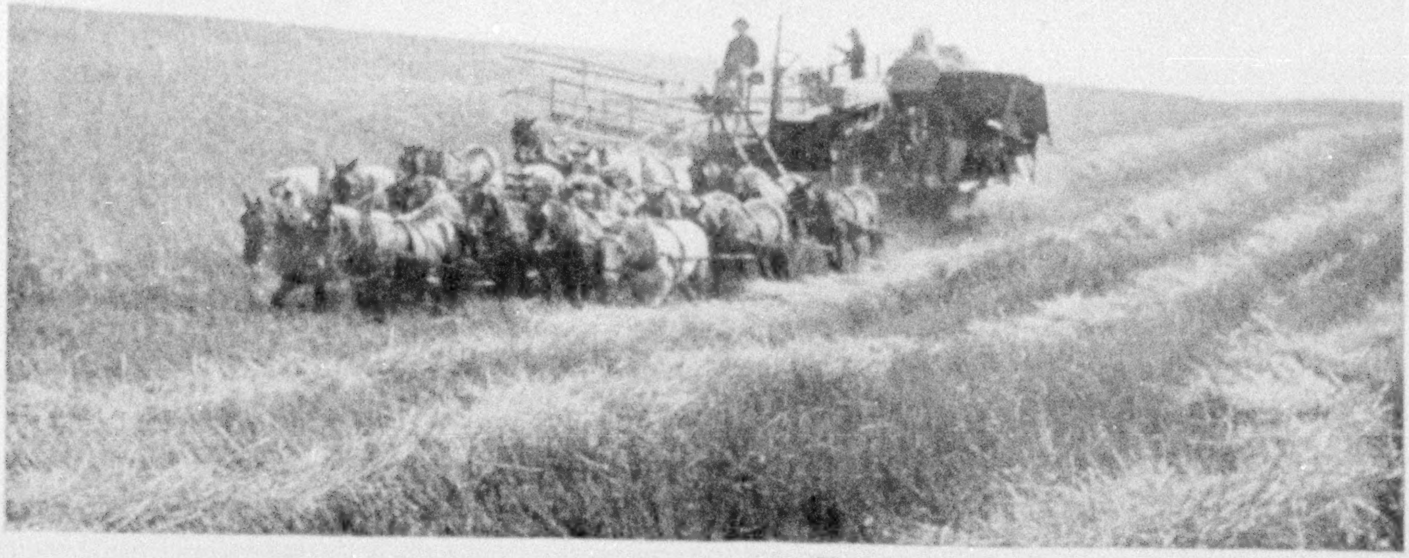
CORN RAISED BY A FARMER OF PRESTON, MINNESOTA

With such agriculture as this the United States and Russia alone could feed the whole world as it is populated today

Photograph by Webster & Stevens

A WHEAT FIELD IN EASTERN WASHINGTON

"It has been strikingly said that he who can add a grain of wheat to each head in the world's wheat fields can give bread to millions of people, and when the United States extends her acreage to its maximum and develops the yield to the limit, nations yet unborn can rise up and secure bread from her flour bins" (see text, page 24).



Photograph and copyright by Keystone View Co.

BONANZA FARMING IN THE NORTHWEST

This machine cuts, threshes, bags, and weighs the wheat in a single operation. The teamster who can handle the fifteen to thirty horses required to operate it commands good wages.

an egg, some fruit, a bit of sugar-cane, and some cooked rice.

The husks of rice stick so tightly to the grain that the latter is left rough when the husk is removed. The grains are thrown upon rollers covered with sheepskin and polished just as we might polish silver or gold. Medical science has learned that the absence of the elements contained in the rice husk produces the disease known as beriberi when an exclusive rice diet is eaten, just as a too exclusive diet of corn produces pellagra.

These two discoveries open up an entirely new field in the investigation of the causation of little understood diseases. They rank with the discovery of the method of transmitting malaria, yellow fever, bubonic plague, and sleeping sickness by mosquitoes, fleas, and tsetse flies, respectively.

THE PLACE OF THE POTATO

It has been the honor of America to contribute to the world its greatest crop in point of yield — the white potato. Making its bow to civilization from the land of the Incas, in Peru, the potato has girdled the globe, winning the esteem of every land and every people.

No other plant in the entire range of the vegetable kingdom has ever gone so far or met with such universal favor in so short a time as this apple of the earth. Today North America produces more than half a billion bushels, while Europe produces approximately ten times as much as our own continent, and has practically a monopoly of the potato-growing industry, producing nine out of every ten bushels grown in the world (see p. 106).

A NEW BEAST OF BURDEN

Figuring to such a large extent in the diet of the race, the potato offers a solution of one of the important problems that the farmers of the earth are facing. There are more than one hundred million horses in the world, most of them being found on the farm. To provide these horses with grain and hay and pasturage requires several hundred million acres of the world's best land.

It so happens that the potato is an admirable material out of which to make alcohol for motive power. Under modern methods of distillation, a few acres of potatoes can be made to yield enough alcohol to drive the farm-tractors of an ordinary farm. The average farmer has held to the horse as a means of transportation because he could use him without

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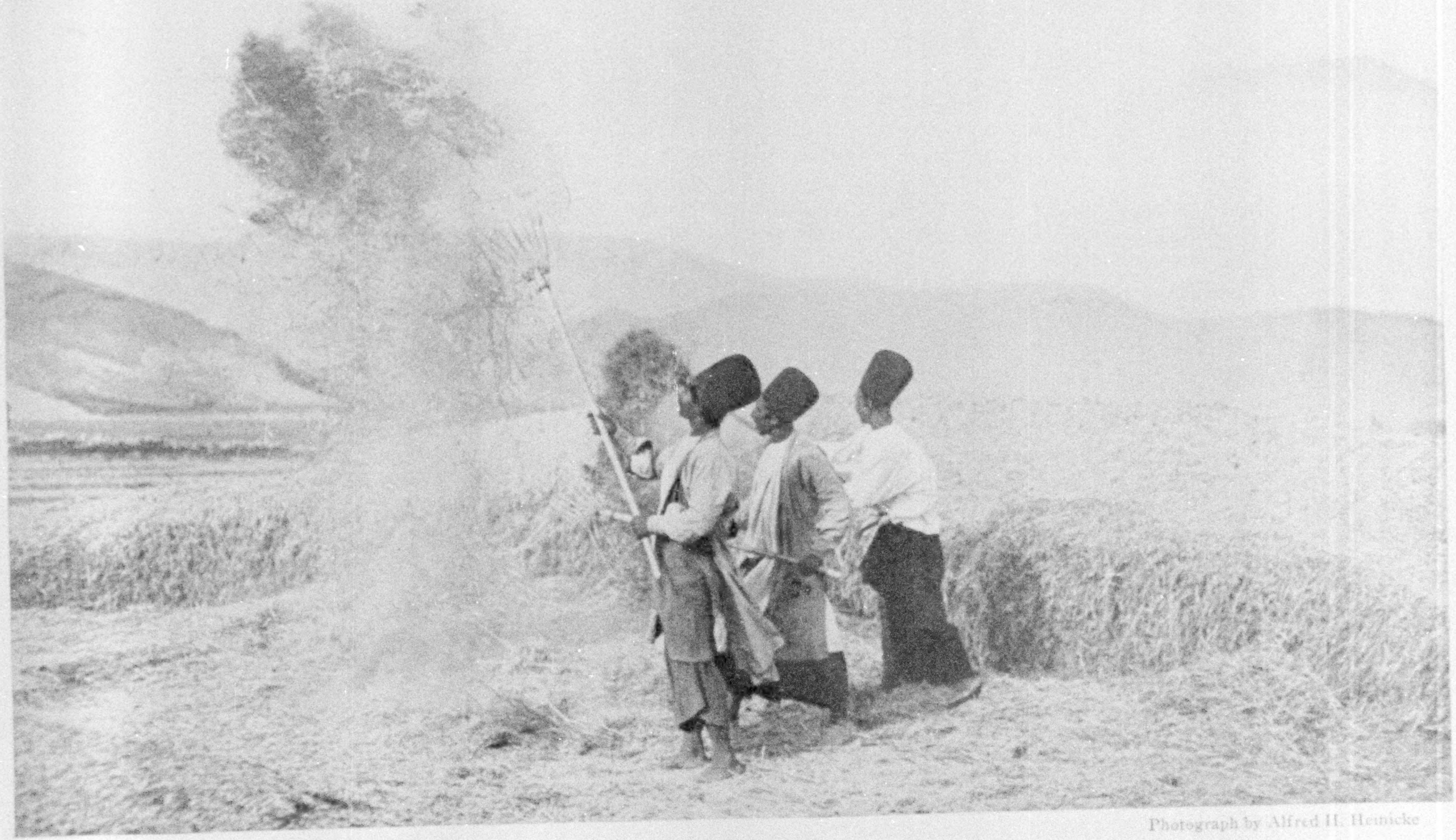

Photograph by Alfred H. Heinicke

WINNOWING WHEAT IN PERSIA

A comparison of this picture with those on pages 35 and 37 shows how man has multiplied his productive capacity many times since the advent of farming with machinery

Photograph from U. S. Department of Agriculture

THRESHING TIME IN THE WHEAT BELT

"That wonderful country (Russia), possessing more latent agricultural resources, perhaps, than any like area in the world, has 288,000,000 acres of excellent wheat land. Even at our standard of production, which is less than half of that of western Europe, Russia alone could produce more wheat than is raised on the entire globe today. As matters now stand, the Russian crop is about ten bushels per acre" (see text, page 25).

CULTIVATING RICE IN ASIA

"Could we, like Maupassant, turn loose our fancy as we dine, we could see a great army of men and women working that we might eat. The appetites of men now levy tribute upon all the continents and all the seas, and, where once all roads led to Rome, now they come directly to our dinner tables" (see text, page 104).

SOWING RICE BROADCAST: SIAM

Medical science has learned that the absence of the elements contained in the rice husks produces the disease known as beriberi when an exclusive polished rice diet is eaten, just as a too exclusive diet of corn produces pellagra

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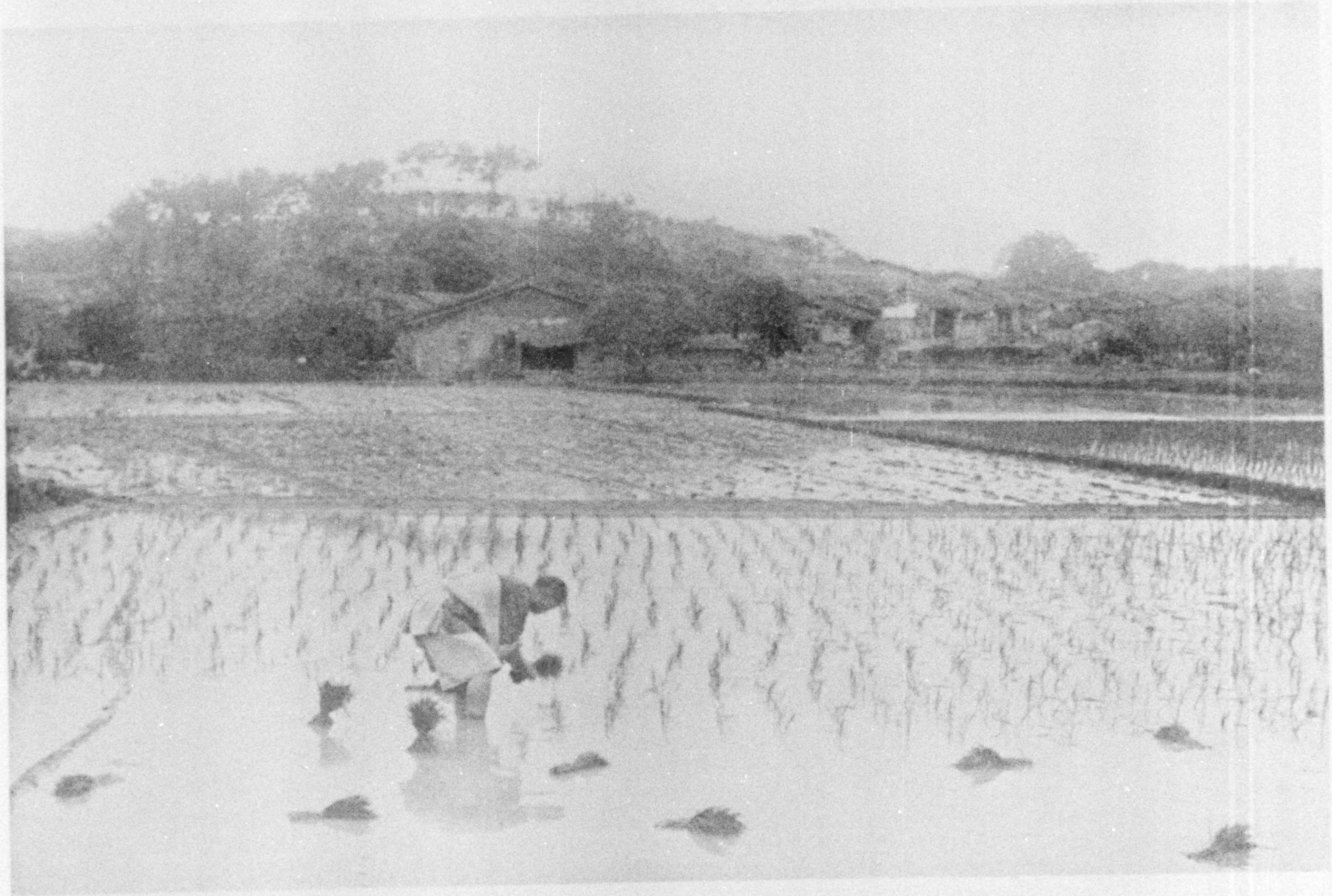
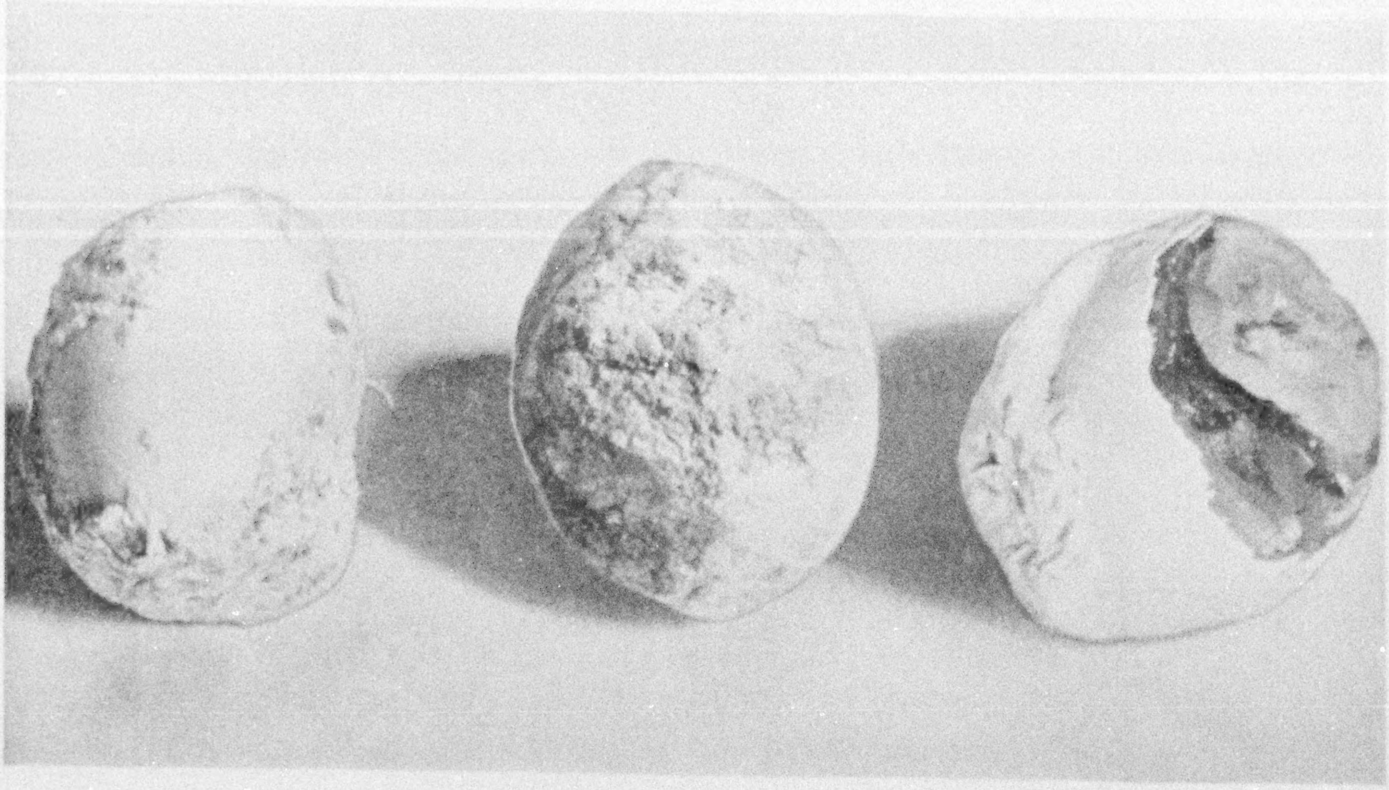


TRANSPLANTING RICE IN AN INUNDATED SOIL: JAPAN

Rice yields best in lowlands subject to occasional inundations. In some districts it is sown broadcast (see page 39) and in some districts is transplanted after two or three weeks. The best rice soil is often not well suited for any other crop. Asia produces 99 out of every 100 pounds of the world's rice.



Photograph and copyright by the International Press Photo Co.

CHINESE EGGS WELL RIPENED

The ancient egg in China has as much standing in good society as wine of rare old vintage in Europe, there being no accounting for taste

Photograph and copyright by the International Press Photo Co.

CHINESE EDIBLE BIRDS' NESTS ARE WORTH THIRTY DOLLARS A POUND

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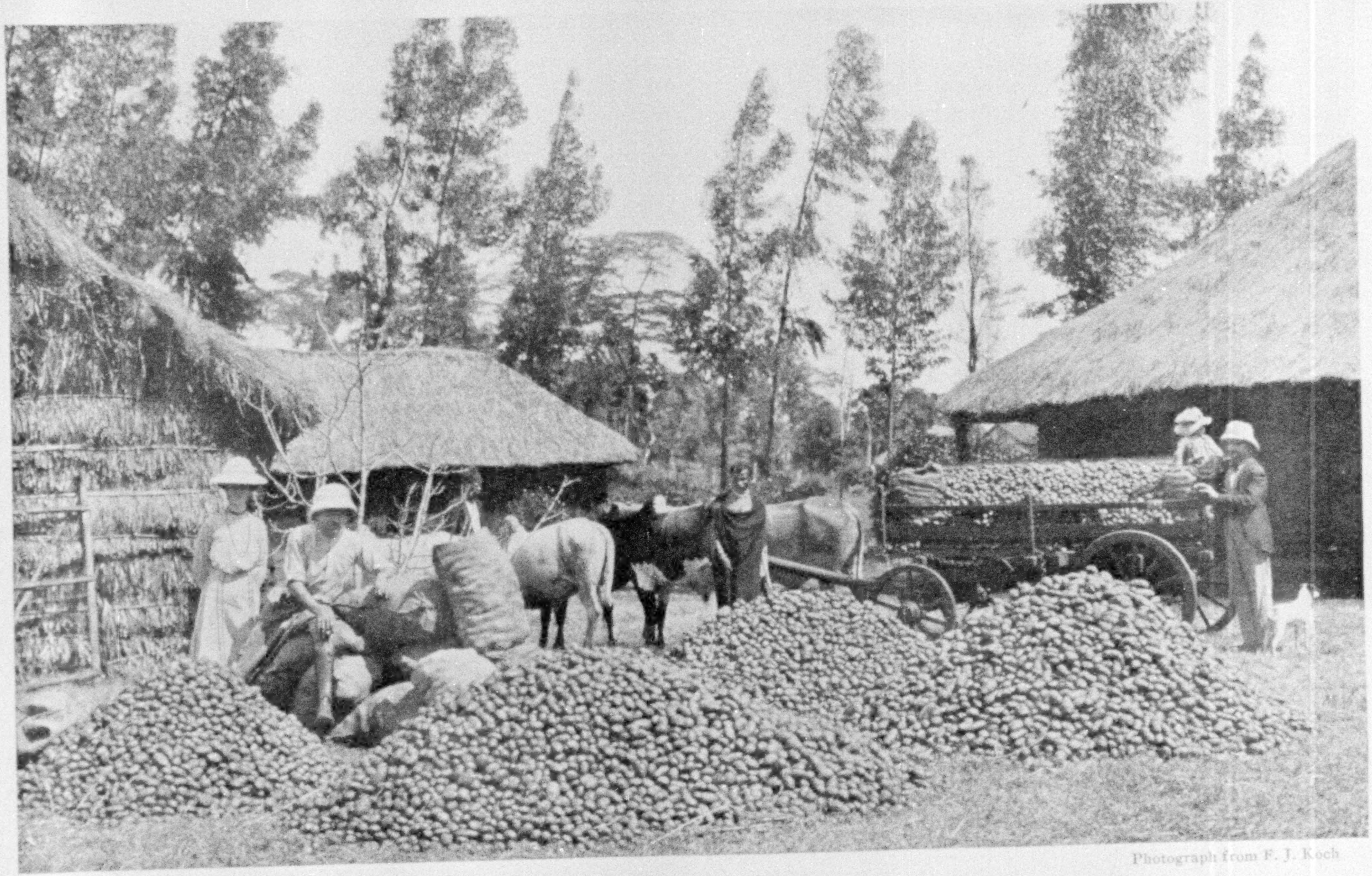

Photograph from F. J. Koch

BRINGING IN THE POTATO CROP: NEAR NAIROBI, EAST AFRICA

"It has been the honor of America to contribute to the world the greatest crop in point of yield—the white potato. Making its bow to civilization from the land of the Incas, in Peru, the potato has girdled the globe, winning the esteem of every land and every people. No other plant in the entire range of the vegetable kingdom has ever gone so far or met with such favor in so short a time as this apple of the earth" (see text, page 35).

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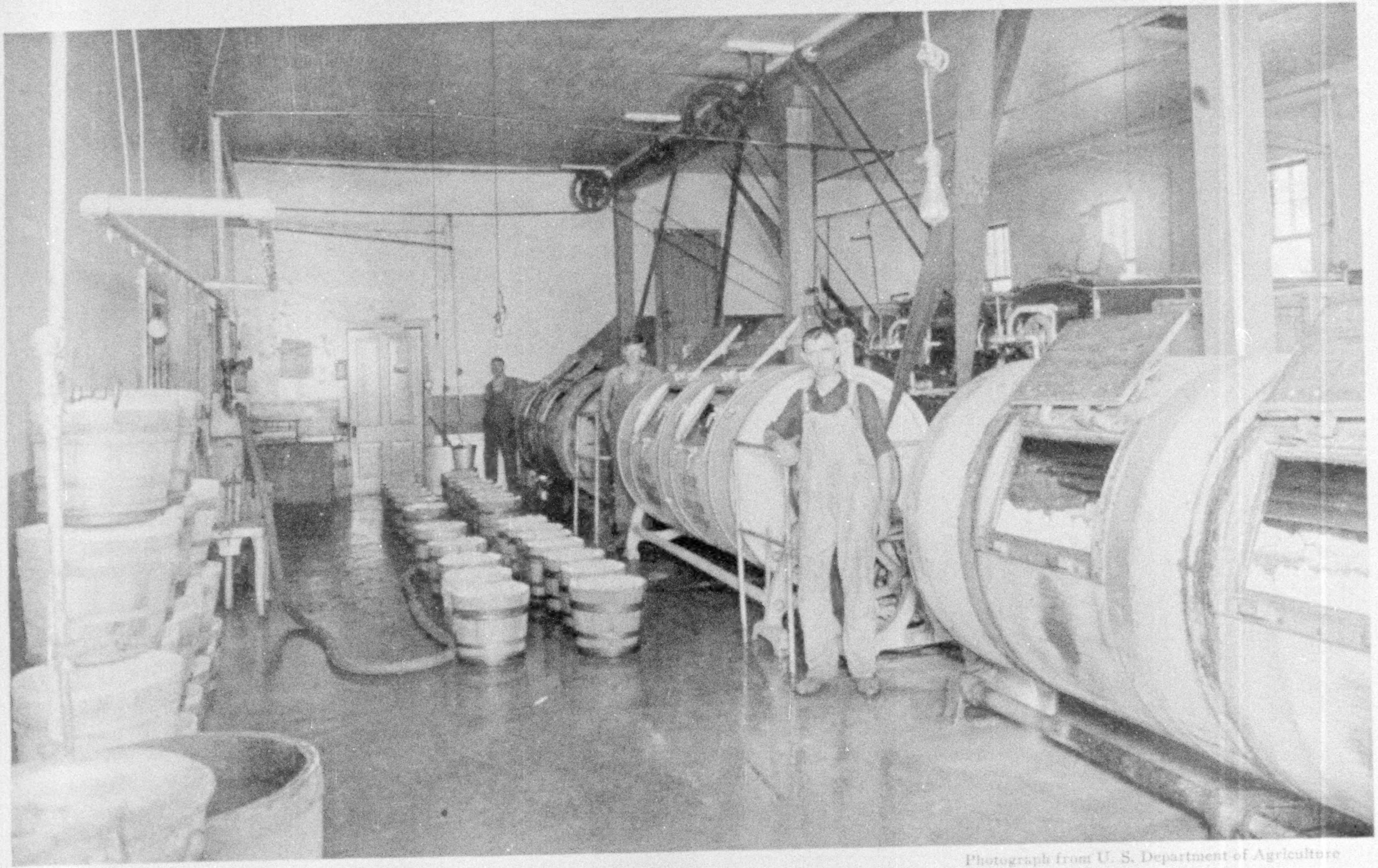
Photograph by Curtis & Miller

HOLSTEIN-FRIESIANS ON A MODERN DAIRY FARM

The cows of the United States give between six and seven billion gallons of milk a year. In other words, we use upward of five gallons per month per capita. The average American eats about seventeen pounds of butter annually.



Photograph from U. S. Department of Agriculture

CHURNING BUTTER IN A COÖPERATIVE CREAMERY

The twentieth century rural housewife is exchanging the old-time skimming ladle for a modern cream separator, and in doing so is taking another step toward her emancipation from the drudgery and grind of farm life

Photograph and copyright by Underwood & Underwood

PACKING BUTTER IN TUBS FOR CITY MARKETS

There is probably no other commodity in the American market basket that needs regulation today more than butter. The butterfat furnished to creameries comes from nearly half a million farms, and a given pound of butter may contain butterfat from a score or more of farmers' dairies. The tuberculosis germ finds butter a fine vehicle in which to travel long distances in quest of some run-down system to attack.

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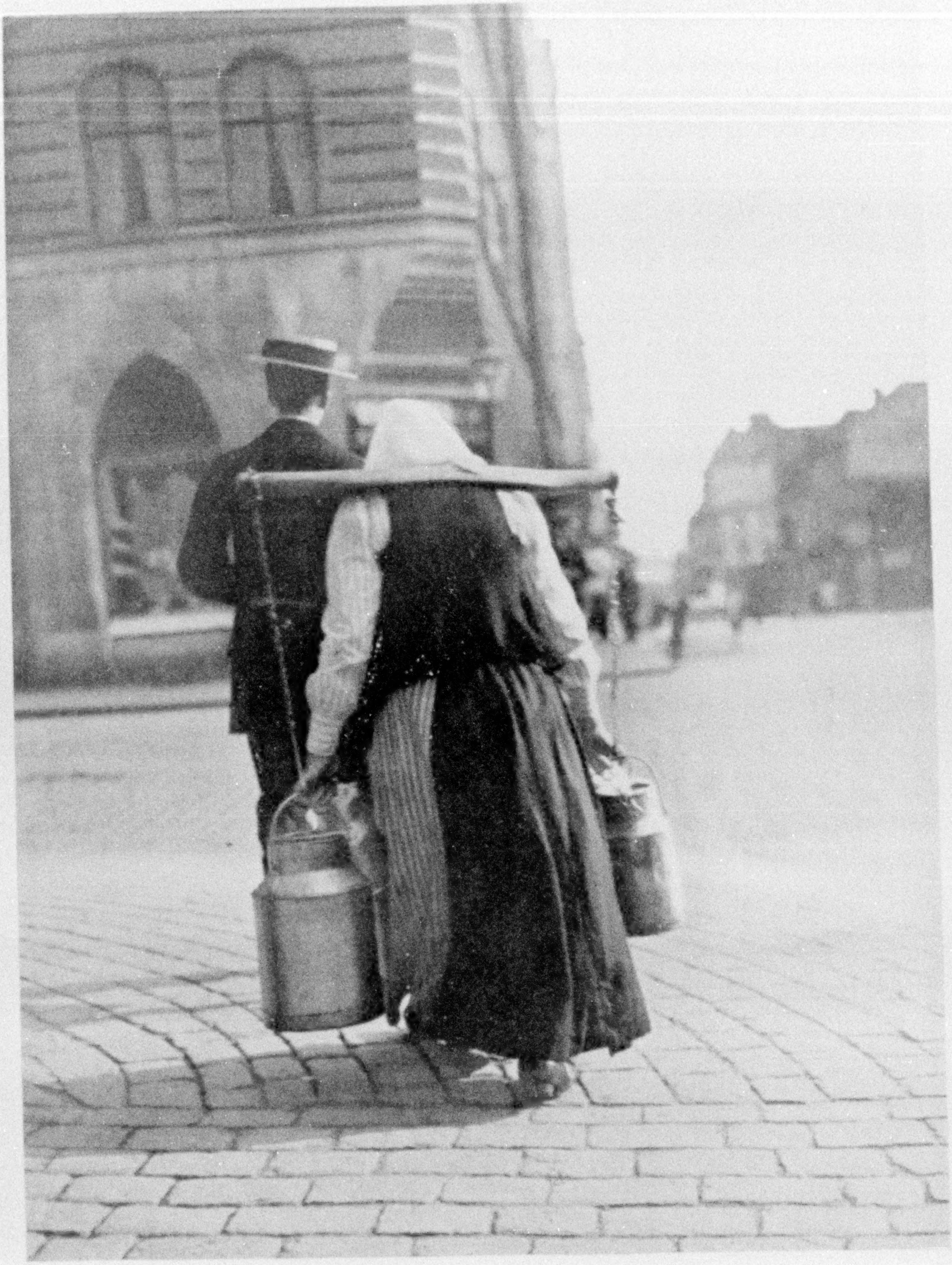
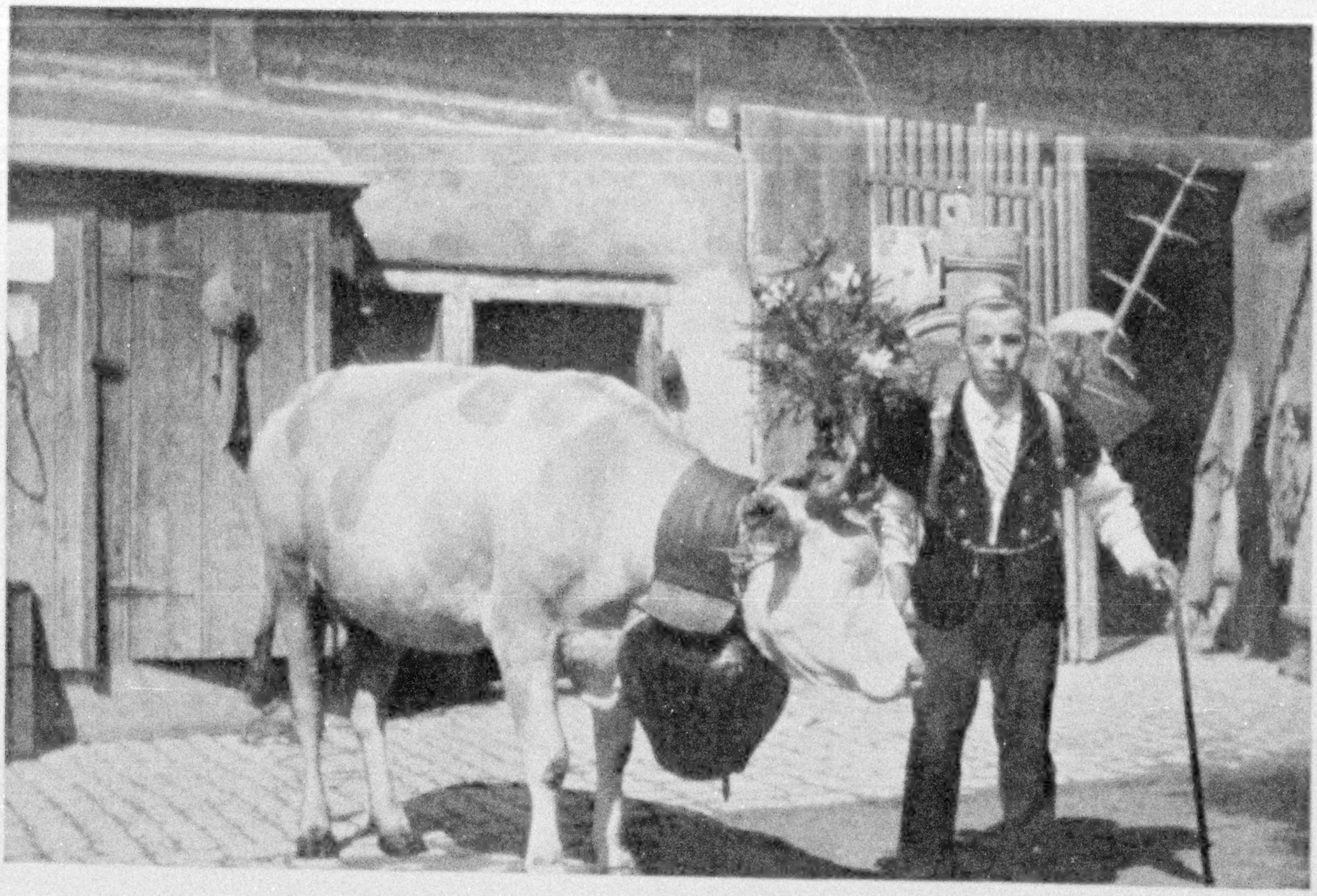


Photograph by Gilbert H. Grosvenor

MILKMAID IN STOCKHOLM, SWEDEN

The "milkman" comes afoot in Sweden, in a dog-cart in Belgium, on the hoof in parts of Spain and South America, with a spick and span team and in a uniform in Washington



Photograph by Alix Bodenheimer

THE LEADING COW, WITH ANTIQUE BELL, LEAVING FOR THE ALPS IN SPRING

The cowbells, which are worn by all cattle while pasturing in the Alps, assist the cowherds in preventing the cattle from straying. These cowherds form a distinct class, who do not own the cattle they tend. The milk given each day is entered in a book, and then made into butter or cheese, the cowherds and the cheesemaker having a right to a certain proportion of the milk for their own use. At the end of the season the proceeds from each cow is turned over to the owner, and the herder receives a share, together with a small sum for each cow tended.

making any actual outlay of cash for his keep.

A very much smaller acreage and a very much smaller investment of labor would provide the necessary alcohol for a tractor-operated farm than would be required to feed the horses the tractors would substitute. Many advanced farmers in various parts of the world have substituted the horse with potato-alcohol-driven motors, and with remarkably successful results. It would be one of the most revolutionary developments of human history if the humble potato should become at once both team and food. The world's present potato crop is approximately large enough to fill two-thirds of the Panama Canal.

MILK A UNIVERSAL COMMODITY

In any discussion of the world's market basket the importance of milk cannot be overlooked. In the United States alone we produce more than six billion gallons a year. This is an average of nearly one gallon per cow a day. Exclusive of the milk and cream consumed on the farms of the country (which, by the way, represents the bulk of our production), our dairy products are worth $600,000,000 a year (see page 44).

In other words, they are worth enough to build a Panama Canal and pay for the maintenance of the American army and navy every year.

Only one-third of all of the milk produced in the United States is sold from the farm. Much of that which remains is used for domestic purposes there, although a billion pounds of butter is proudly exhibited by the American farm as one of its by-products.

The total production of butter in the United States is around 1,700,000,000

JARDIN DE ITALIA

THE MILK PEDDLER: CARACAS, VENEZUELA

pounds. While ten out of every seventeen pounds of our butter is produced on the farm, nearly all of our cheese is made in factories (see page 67).

MILK FROM MANY ANIMALS USED

Milk is used everywhere that man lives, and it is secured from many different kinds of animals. Around the Arctic Ocean the Laplander milks his reindeer and freezes the milk into blocks to keep until needed; in the desert regions of Asia and Africa the natives drink the milk of camels and donkeys; in western Asia there are wandering Tatar tribes who live largely on mare's milk. In many countries the goat is the poor man's cow, while sheep milk is widely used in the manufacture of cheese in Europe.

In recent years Russia has built up a large dairy industry in Siberia, and before the war great express trains, sweeping across two continents, carrying nothing but dairy products, were a striking object-lesson of the world's craving for butter and cheese. The Chinese, Koreans, and Japanese use comparatively little milk, their countries being too populous to admit of the keeping of many cows.

BUTTER AND CHEESE TRADE

Little Denmark leads all the countries of the world in the exportation of dairy products, and Danish butter is known wherever good living is enjoyed. Danish dairymen have been imported to all parts of the temperate world to teach the secrets of high-class dairying (see page 45).

The volume of butter which in normal times reaches the channels of international trade amounts to 728,000,000 pounds, which is less than half of the butter production of the United States alone. The per capita consumption of butter in the United States is about 17 pounds. On the same basis, Germany would consume 1,139,000,000 pounds. In 1913 that country imported 122,000,000 pounds more than it exported.

It will be seen from this that if she normally uses as much butter as we do, her shortage would be 10.7 per cent. However, Norway, Sweden, Denmark, and Holland have about 326,000,000

Photograph from U. S. Dept. of Agriculture

THE FATHER OF A GOOD FARMER

As the child is father to the man, so the youthful member of a boys' corn club is the father of a farmer who will help to solve the food problems of future generations.

XUM

Photograph from U. S. Dept. of Agriculture

A MODERN MILKMAID

Twentieth century science is fast emancipating the American farmer's family from the burdens of the past. This young woman from Tennessee so distinguished herself as to win two State championships in women's farm work, and she is today on the payroll of Uncle Sam as an evangelist of the new Emancipation.

Twentieth century science is fast emancipating
so distinguished herself as to win two State championships in women's farm work, and she is
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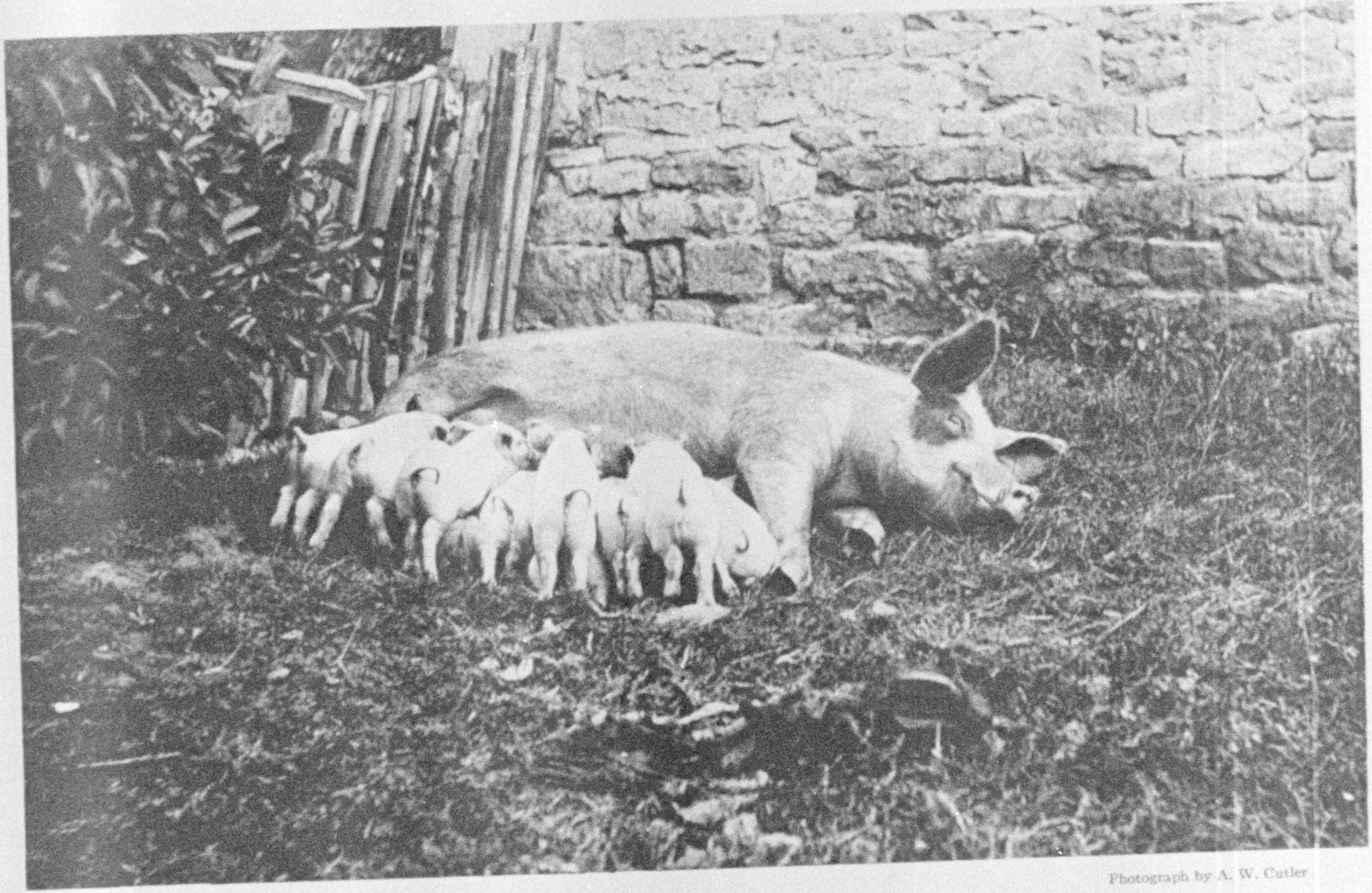
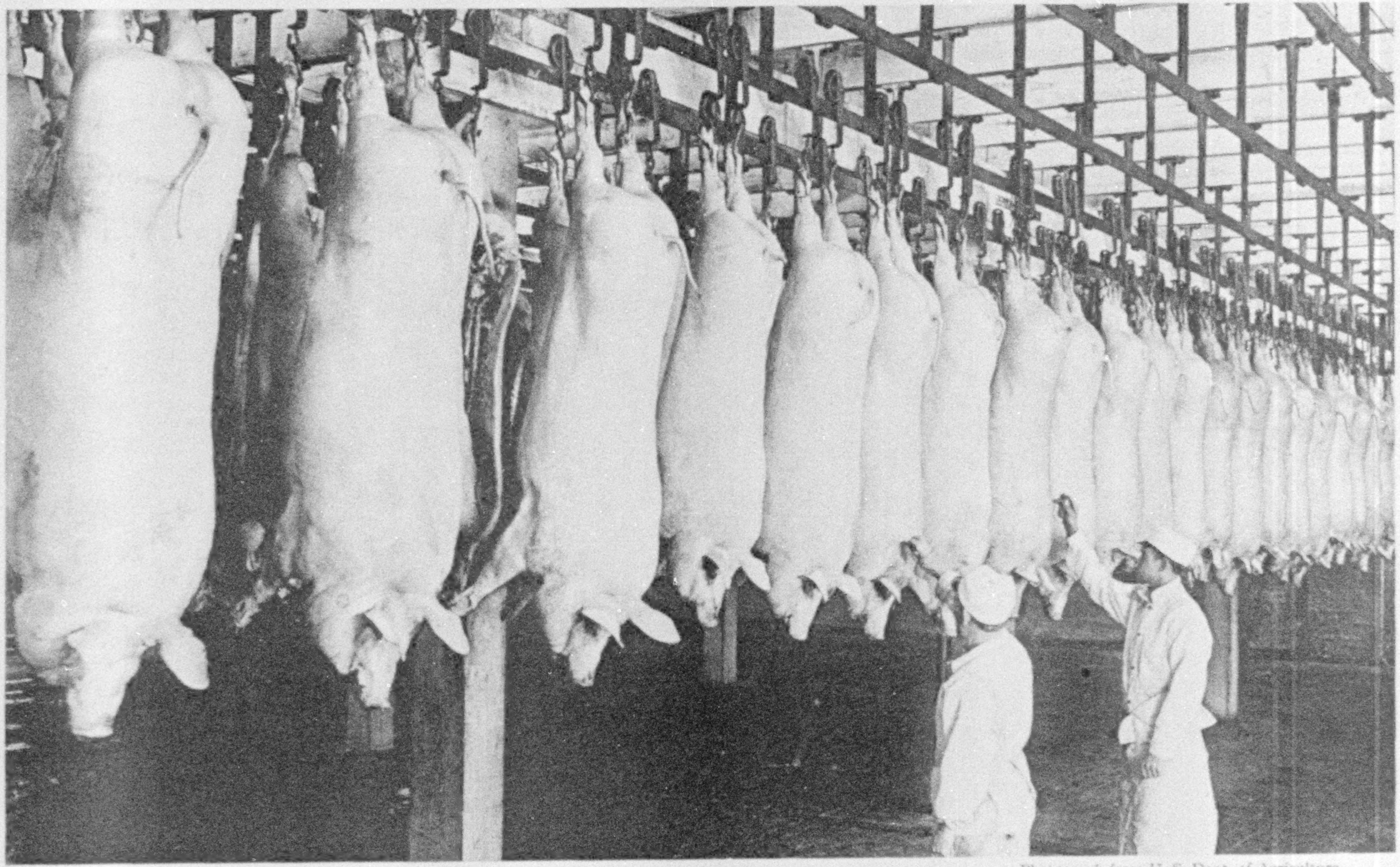


Photograph by A. W. Cutler

SELF-INVITED GUESTS AT A STAND-UP LUNCHEON

"Pigs is pigs," but after the first few days each has his own special place at the "table."



Photograph from U. S. Dept. of Agriculture

THE GOVERNMENT'S SEAL OF APPROVAL

When the meat inspection law was enacted in 1906, it insured the people of the country that at least three-fifths of the meat they eat is the product of healthy animals slaughtered under proper conditions. There is an inspection of the live animals, and another of their viscera, as well as of the meat itself. Even the railroads are forbidden, under heavy penalty, to ship any meat in interstate commerce that does not have the seal of the Government's approval thereon. There is no Government inspection of meat consumed within the state of origin, or of that slaughtered by retail butchers or on the farm.

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Photograph from U. S. Forest Service

A WESTERN FLOCK RESTING BENEATH THE TREES IN A NATIONAL FOREST RESERVE
Archeological research points to the fact that the sheep probably was the first food-animal domesticated by man.

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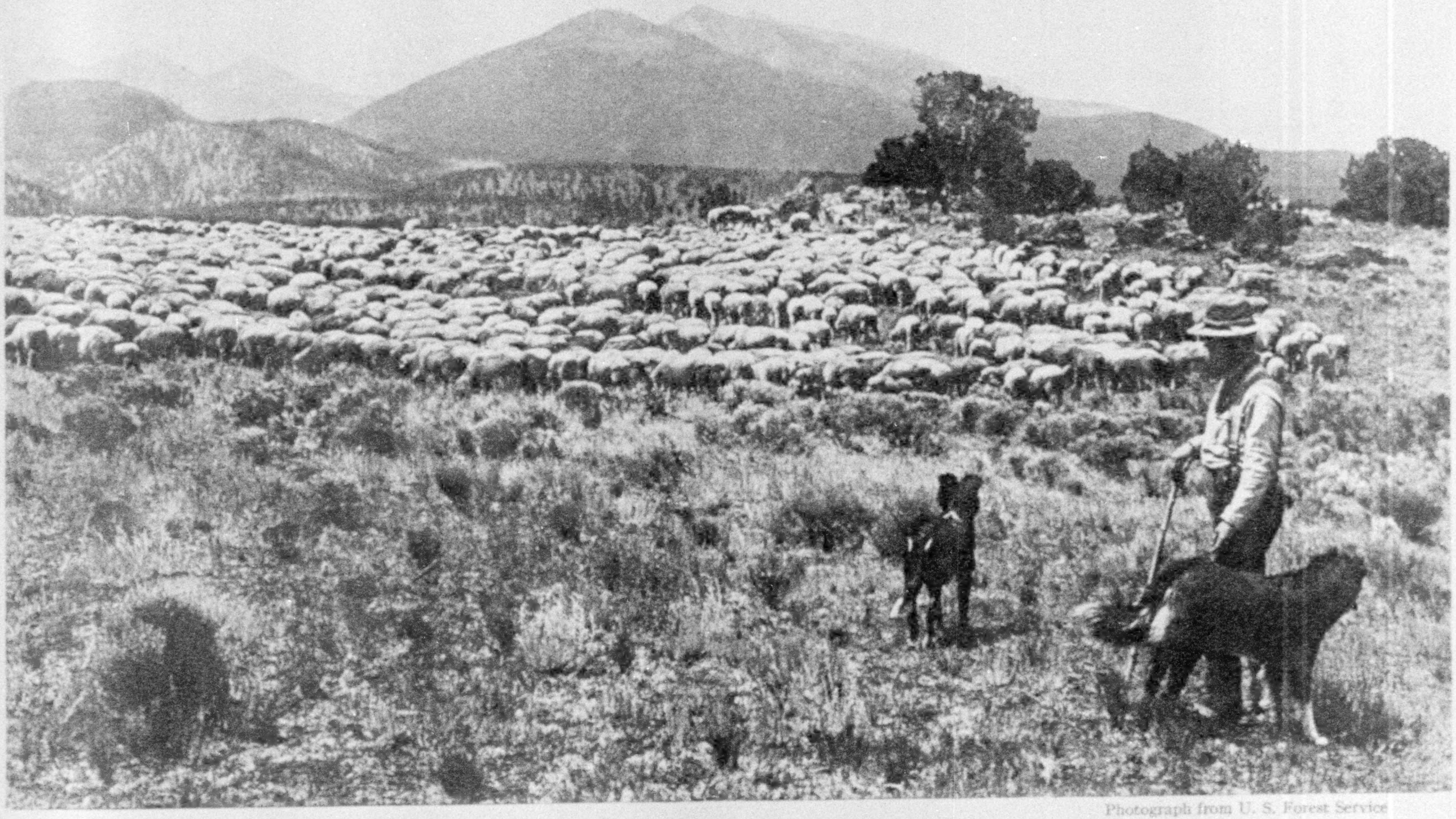


Photograph from U. S. Forest Service

THE TWENTIETH CENTURY SHEPHERD AND HIS FLOCK

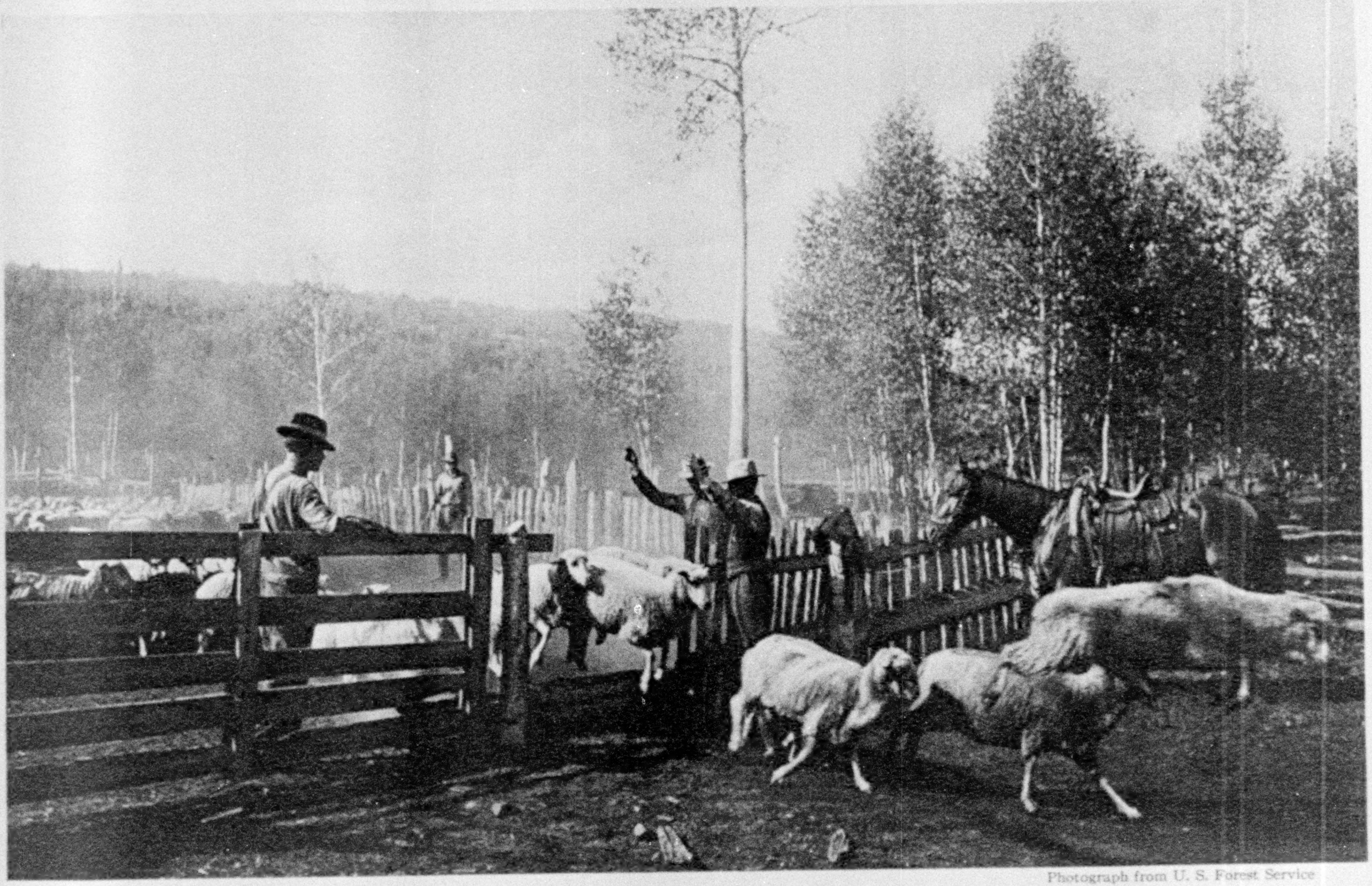
Nowhere does the intelligence of a dog appear to better advantage than when acting as chief assistant to a shepherd. They seem to read the minds of their charges, and instinctively to meet every emergency that arises out of that strange combination of natural timidity and follow-your-leader spirit which characterizes the sheep.

leader spirit which characterizes the sheep.

Photograph from U. S. Forest Service

COMING DOWN TO THE WATER HOLE

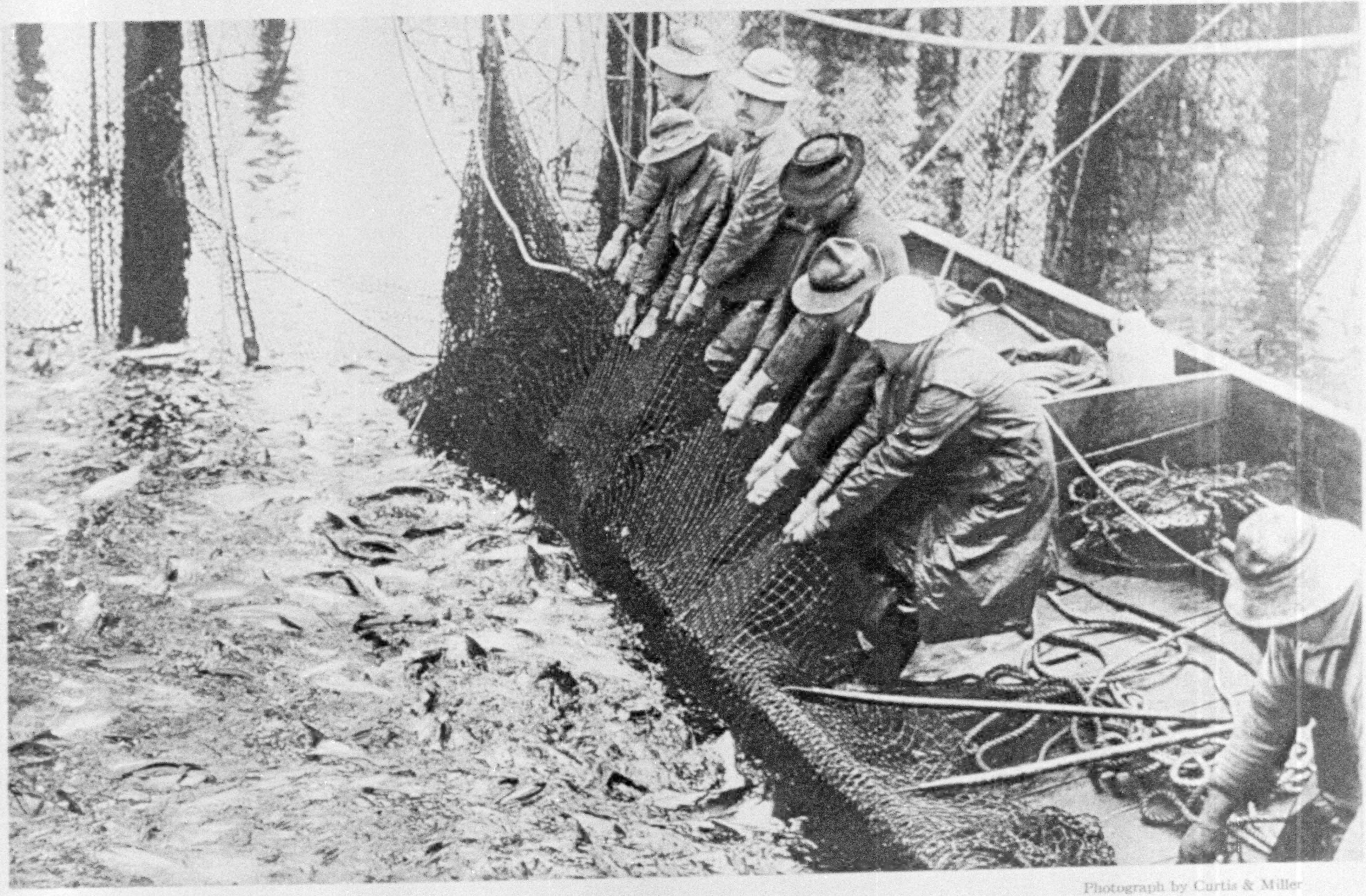
There are more sheep in the world than any other kind of domesticated quadruped. There are only one-sixth as many horses, and one-fourth as many hogs. There are 631,000,000 sheep as compared with 434,000,000 cattle.



Photograph from U. S. Forest Service

"FIVE, SIX, SEVEN"

Sheep Herder and Forest Ranger jointly counting a flock that is to be turned out to graze on the public domain at so much per head. Last year 7,232,000 sheep were pastured on the succulent grass which grows on the lands dedicated to the National forests.



Photograph by Curtis & Miller

A PROFITABLE HAUL

Europe's expanding population forced her to face a meat shortage before America was born into the family of nations. She turned to the sea and it responded with low-priced fish as a substitute for high-priced beef and pork.

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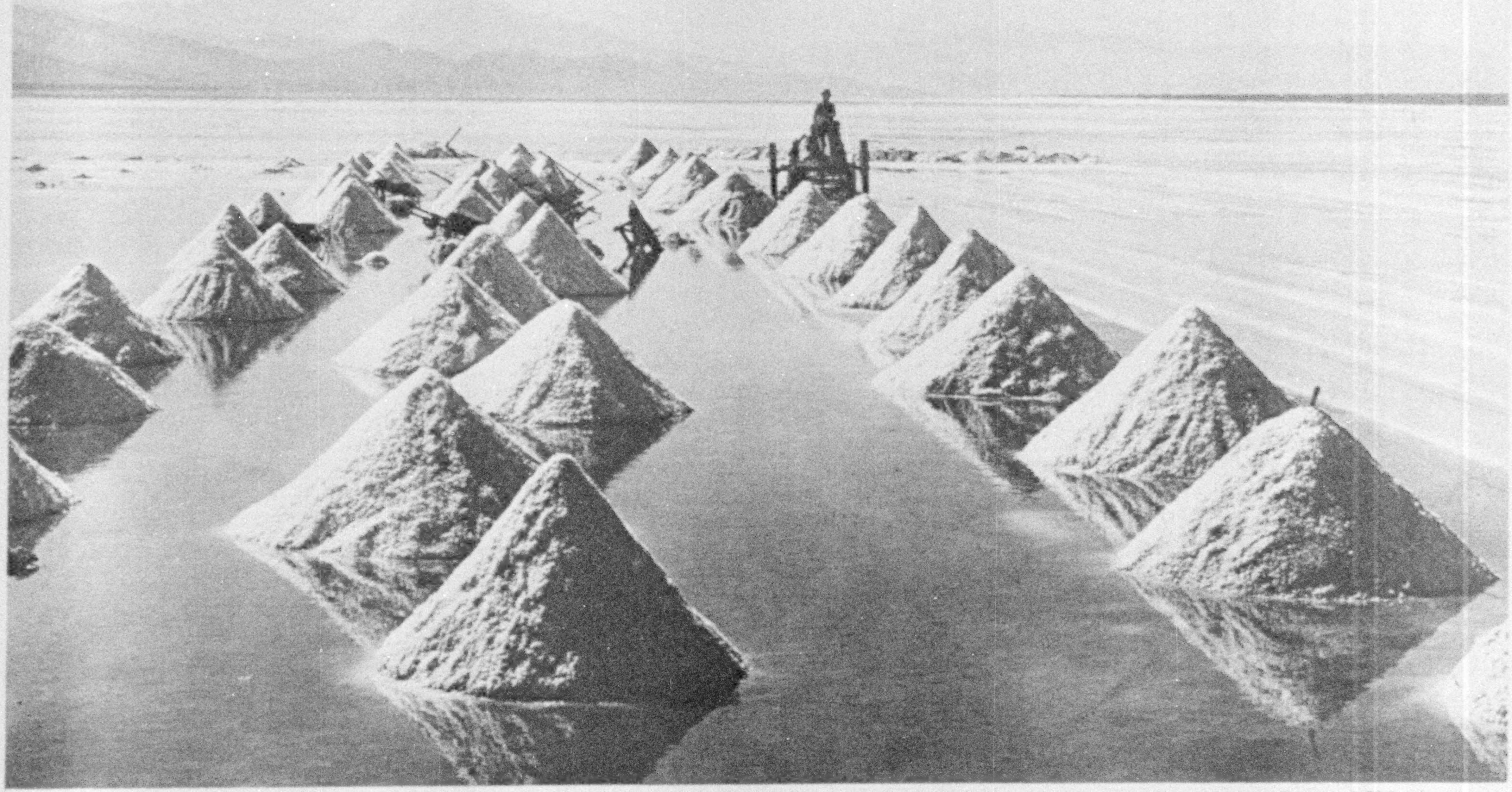

Photograph by Putnam & Valentine

CALIFORNIA SALT BEDS

The world's annual production of salt approximates thirty billion pounds, of which the United States of America produces nearly one-fourth. It is said that the earliest trade routes of the world were established for the transportation of salt and incense, the two great articles of international commerce in the ancient world.

is said that the earliest trade routes of the world were established for the transportation of salt and incense, the two great articles of international commerce in the ancient world.

Photograph by Curtis & Miller

A PEACH AMONG PEACHES—WASHINGTON STATE

Photograph by Brown Bros.

IN THE EMBRACE OF WINTER

Is there anything more beautiful than a laughing, sparkling stream, snow-lined to its brink, and yet so busy in its onward rush to the sea that the approaching ice dare not bridge its depths?

Photograph by Brown Bros.

A SNOW-BOUND LOVERS' LANE

Photograph by Brown Bros.

A UNIVERSITY CAMPUS IN JANUARY

The brisk west wind and the snappy clear cold put the stamina of endurance into man and woman.

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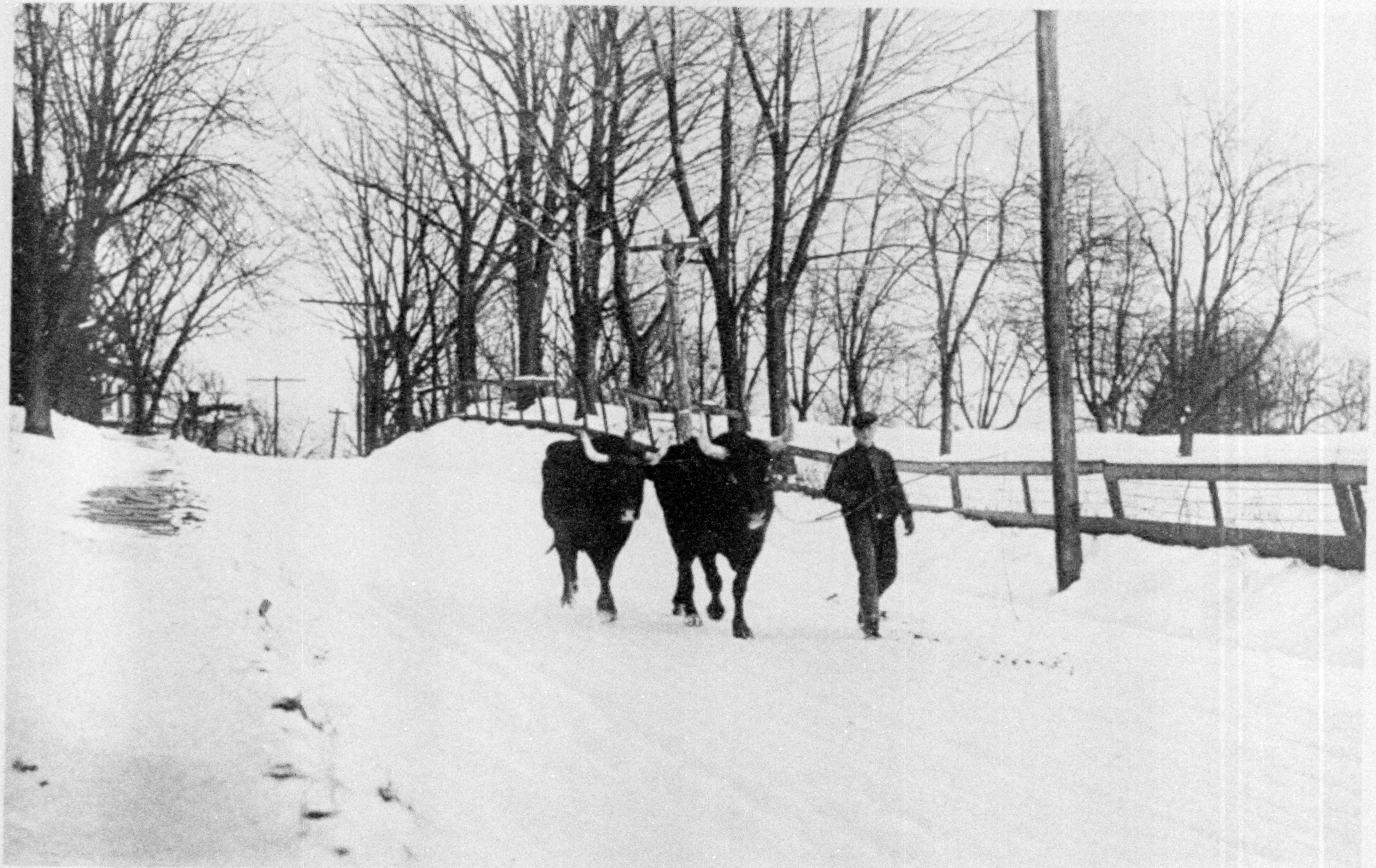

Photograph by Brown Bros.

OFF TO A WINTER MORNING'S WORK

The hardy New England farmer is up betimes of a winter morning when Nature slumbers beneath a blanket of snow, and an overcoat would be useless baggage to him as he fares forth to his labors.

Photograph by Brown Bros.

THE LITTLE RED SCHOOLHOUSE

Although the little red schoolhouse and the three R's that were taught within its walls are largely giving place to the consolidated rural school and the redirected rural curriculum, it is still enshrined in the hearts of many millions of sturdy Americans who received their early education there.

pounds to export annually, while Austria-Hungary has a surplus of 4,000,000 pounds. In normal times England takes three-fifths of the world's surplus of butter; in 1912, out of 728,000,000 pounds moving in international commerce, the United Kingdom took 435,000,000 pounds.

There are no world statistics of the production of cheese, except of that part moving in international trade. The United States annually produces about four pounds per capita. The total amount imported by all the countries of the world is 531,000,000 pounds, of which the United Kingdom takes 250,000,000, Germany 47,000,000, and Austria-Hungary 13,000,000 pounds. Bulgaria exports 7,500,000 pounds, and Holland and Switzerland have 190,000,000 pounds to give a cheese-hungry world.

VEGETABLES AND FRUITS

The Department of Agriculture estimates that one-fourth of our country's diet consists of vegetables—products of the truck garden. If this is true of the United States, which, next to Australia, is the world's largest per capita meat-eater, it is more true of other countries. Our census returns show that we produce, exclusive of potatoes and sweet potatoes, vegetables to a value of $216,000,000.

The tomato takes first rank, with a $14,000,000 production to its credit; the onion contributes exactly one-half as much to the total as the tomato, while sweet corn makes a successful bid for third place; watermelons get fourth place, with a production valued at $5,000,000, and cantaloupes add $4,000,000 more to the total. Green beans and green peas are $3,000,000 crops. These figures deal almost entirely with the production that gets to the city market and not with the vegetables raised for consumption on the farm (see pages 4 and 107).

THE KITCHEN GARDEN

There is probably no farm-house in all the land so poor as to be without its vegetable garden and its truck patch, and between the dried beans, corn, peas, etc., and the canned cucumbers, beets, tomatoes, ketchup, and what not, the rural housewife takes her family into the winter with the assurance that, high cost of living or no high cost of living, there will be no dearth of vegetables on her table.

If the products of the vegetable garden figure extensively in the world's diet, they play no greater rôle than the products of the orchard, vineyard, and berry patch. The total yield of the latter, according to the last census, is worth $222,000,000 a year.

Orchard fruits are produced to an annual value of $140,000,000. We produce a bushel and a half of apples per capita, a third of a bushel of peaches, two quarts and a half of strawberries, and other things in proportion. Grape-vines and citrous trees each yield $22,000,000 worth of fruit a year, while our berry crop is valued at $29,000,000 (see page 73).

While most of our fruits and vegetables come to us in their natural state or canned, the country annually produces millions of dollars' worth of dried fruits—a production which figures more largely in other parts of the world than in our own.

THE ART OF CANNING

It is only a little more than a century since the fruit-jar came into use. Before that the only way of keeping the fruits and vegetables that are now canned was to dry them or put them away in sugar or salt. The invention of the modern process of canning is credited to Nicholas Appert, a Frenchman. His method was to put the food to be preserved in glass jars, set them in boiling water, and, when the contents were thoroughly heated, seal the jar (see also page 1).

Although Napoleon gave Appert twelve thousand francs for his work, he simply had built on foundations well laid by Spallanzani nearly a half century before. The apparatus used by Appert in his canning processes was very crude, but his discoveries laid the foundation for one of the important industries of modern times, and have proved a boon to the urban population of the earth.

While Napoleon Bonaparte paid for the discovery of the canning process, his

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enemy, England, was quick to take up the discovery and to utilize it for her own purposes. About 1815 Ezra Daggert brought to the United States a process for canning salmon, lobsters, and oysters. This process was gradually extended to pickles, jellies, and sauces.

HOUSEWIVES ADOPT SCIENTIFIC DISCOVERIES

It is rather striking to pause and reflect that in a single century humanity has progressed to such an extent that the most ignorant housewife in America can now do work that formerly defied the best scientists of the world (see page 107).

Only the first centennial has passed of William Underwood's invention of a process of canning tomatoes, and it is only seventy-eight years since Isaac Winslow learned how to can corn at Portland, Maine. Today the glass jars of Appert have been succeeded, except in the household canning art, by the tin can, and many wonderful machines have been devised to save labor in the canning industry.

There are hulling machines which will take green peas out of the pods at the rate of a thousand bushels a day; there are separators which will grade the peas according to size; there are corn-cutters which remove the grain from the cob at the rate of four thousand ears an hour, and silking machines which work at equal speed; and there are automatic machines which will fill twelve thousand cans a day. If Nicholas Appert could come to life and go through a modern cannery, with its wonderful equipment, he would doubtless marvel at the mighty oak that grew from the tiny acorn of his discovery.

THE PLACE OF POULTRY

There are no statistics showing the number of domesticated fowls the world possesses, but if the United States' ratio of three per capita were the rule, there would be some five billion of them. It is probable, however, that there are not half that many.

The annual product of the American chicken yard is estimated at $509,000,000. During the last census year the American hen produced nearly twenty billion eggs, of which eleven billion were sold. It will be seen from this that the American farmer keeps a liberal supply of eggs for his own table and for hatching purposes. His receipts from the sale of eggs totaled $202,000,000 (see pages 80 and 81).

We annually raise nearly a half billion chickens in the United States. Out of 488,000,000 raised in the last census year, the farmer kept all but 153,000,000 for his own purposes, which again shows that the farmer's table is not skimped in order that his urban neighbor may eat well.

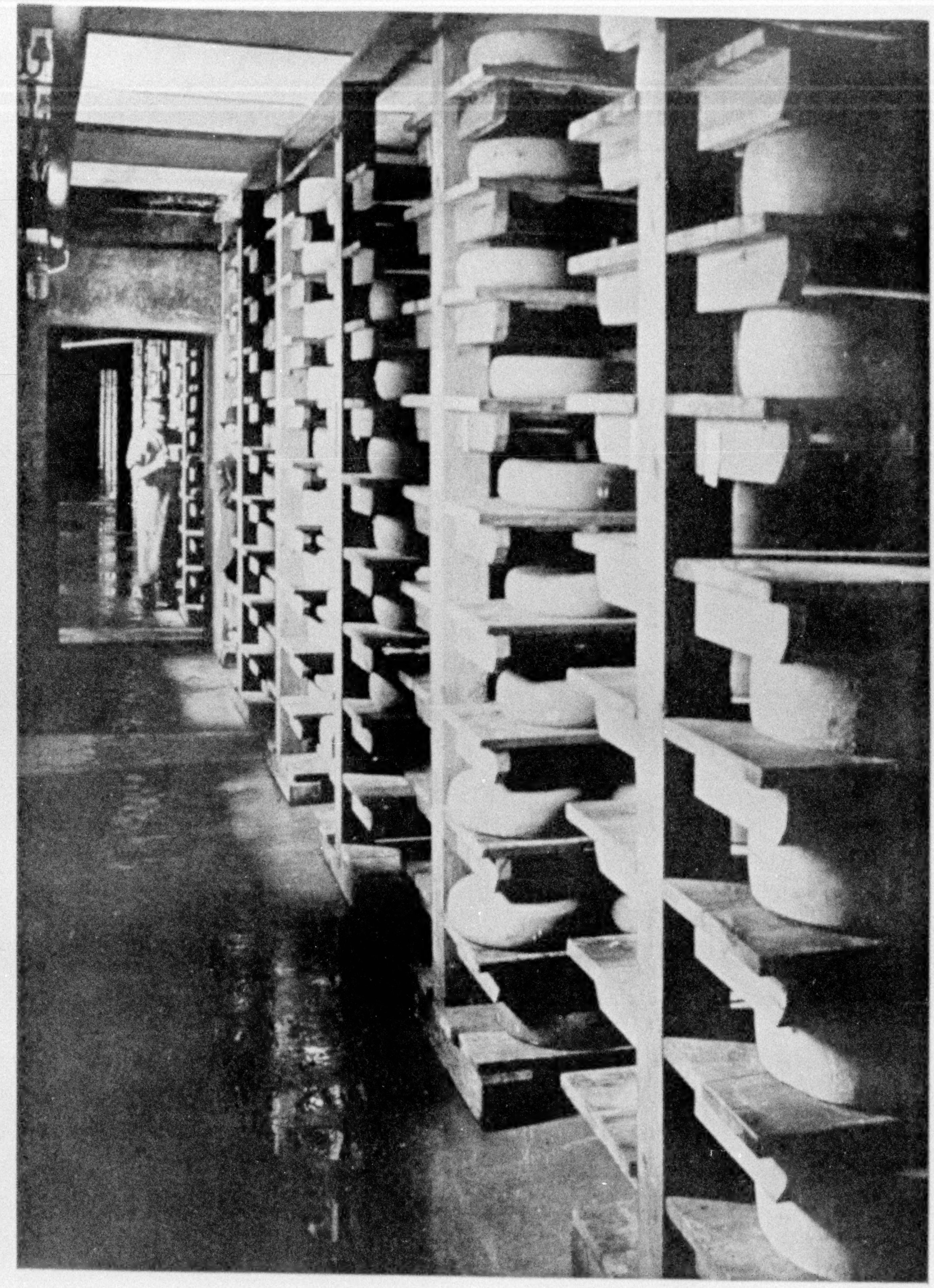
THE INDUSTRIOUS BEE

Nowhere else in the world is the majesty of small things more strikingly revealed than in the story of the production of honey in the United States. That great decennial interrogation mark which marches every ten years through the homes of the American people and asks them a thousand and one questions, has ascertained for us that the bees of the country annually produce twenty-seven thousand tons of honey. That means fifty-four million pounds.

Truly the busy little bee must improve each shining hour to give to the American people fifty-four million pounds of honey, in addition to providing for its own needs. The number of trips from hive to flower and from flower to hive with their tiny loads of honey-making materials that the bees must have taken to bring us these fifty-four million pounds of honey defies estimate, but they afford us an inspiring lesson of what the faithful doing of small things may accomplish.

THE SUGAR INDUSTRY

When one writes of honey his mind turns to sugar—a crop which occupies a very important place in the world's market basket. Humanity always has had a sweet tooth, and the day when sugar was first made from cane is so remote that history is not certain that it can fix the date. And yet in one generation the world has increased its sugar production more than nine-fold. Forty years ago it took only 2,200,000 tons to satisfy the world's sweet tooth; today it takes more than 20,300,000 tons. And still the world is hungry for sugar (see page 87).



Photograph by Underwood & Underwood

HUNDREDS OF CHEESES CURING IN THE RACKS OF AN UP-TO-DATE FACTORY

The people of the United States eat a little more than three pounds of cheese a year. The cheese-making industry has almost entirely passed from the farm to the factory.

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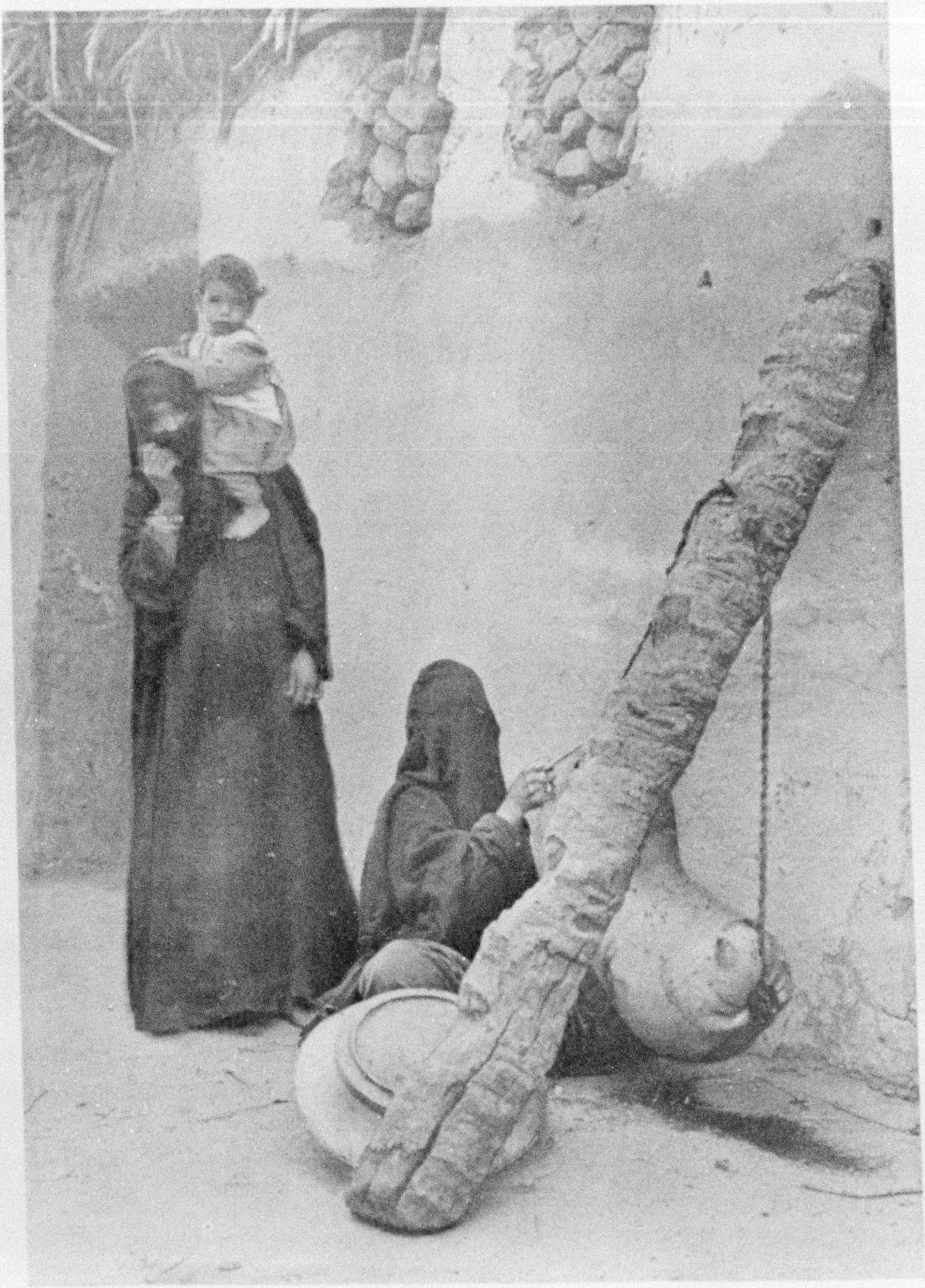

Photograph by A. W. Cutler

ARAB WOMAN AND HER GOATSKIN CHURN

All people must have oil or fat in some form. The Eskimo likes seal blubber, the Spaniard wants his liberal allowance of olive oil. Butter from mare's milk, camel's milk, or sheep's milk is in demand among various peoples.

The American people have increased their annual per capita consumption in that time from eighteen pounds to eighty-nine pounds. The Australian Commonwealth has the sweetest tooth of all the countries of the world, its per capita consumption being 109 pounds. Denmark has second place and Canada third; the United States comes fourth.

The sugar industry is a profitable one to the grower; it was recently estimated that the value of the sugar crop to the grower is $815,000,000, while the price paid therefor by the consumer approximated $2,000,000,000.

A TRADE WITH UPS AND DOWNS

The sugar consumed in any country fluctuates quite appreciably with financial conditions. During every financial depression the per capita consumption declines, and whenever prosperity reaches high tide, sugar consumption approaches its climax. One might write the financial ups and downs of the world in terms of sugar.

The world's production of sugar is divided half and half between sugar-cane and the sugar-beet. Sugar-cane is a very ancient crop, and in many parts of the world one of the most profitable grown. The cane has a preference for the tropics, although it is able to wander as far north as the southern part of the United States.

The sugar-beet, on the other hand, loves a cooler climate, and consequently adds immensely to the world's possible sugar-producing area. While Maggraf discovered that sugar could be made from the beet many years before the Napoleonic wars, it was not until that time that his discovery was put to any large commercial use. There is no difference between the sugar derived from cane and that extracted from beets (see page 86).

A TASTE FOR CANDY

The taste of the American citizen for sweet things is emphasized by his remarkable consumption of candy. We eat a half billion dollars' worth every year, which is said to be more than half the world's total production. The candy habit is one that is not easily changed, and people are inclined to do without sweets unless they can secure their favorite kinds. The candy importers of New York find it necessary to purchase candy from the most remote regions of the world in order to satisfy the demands of immigrants who come from those regions.

The Chinese appear to have first established the art of candy making. Most interesting of their candy products are the candy oranges and the candy eggs, the former the peel of an orange filled with native candy, and the latter the shell of an egg filled in the same way. These have been manipulated in such a way that the purchaser cannot find the opening through which the original contents were ejected and the sweets inserted. To reach the contents of the orange, it is necessary to peel it, and one has to break the egg to get the candy out.

A noted physician has declared that sweetness is to the taste what beauty is to the eye and music to the ear. He says that more than one-half of all the foods in the world have a sweet or sweetish taste, while only one-third possess a salty taste and one-tenth a bitter or sour taste.

He also points out that man is not the only creature with a sweet tooth. One can win the affection of a horse quicker by feeding him sugar than in any other way, while the bear and the fox, in their ravages on the wild honey of the forest and field, probably experience a satisfaction resembling that of a hungry child who surreptitiously gets sweets from mother's cupboard.

Sugar is manufactured from raisins in practically all of the countries of southern Europe and western Asia. There are two forms of raisin sugar imported into New York, one principally from Asia Minor and the other mainly from Spain. The Turks add to the delicacy of grape sugar by the use of small quantities of rosewater.

CIVILIZATION'S COFFEE CUP

The people of the world annually consume more than two and one-half billion pounds of coffee—enough to load a train of cars reaching from Philadelphia to

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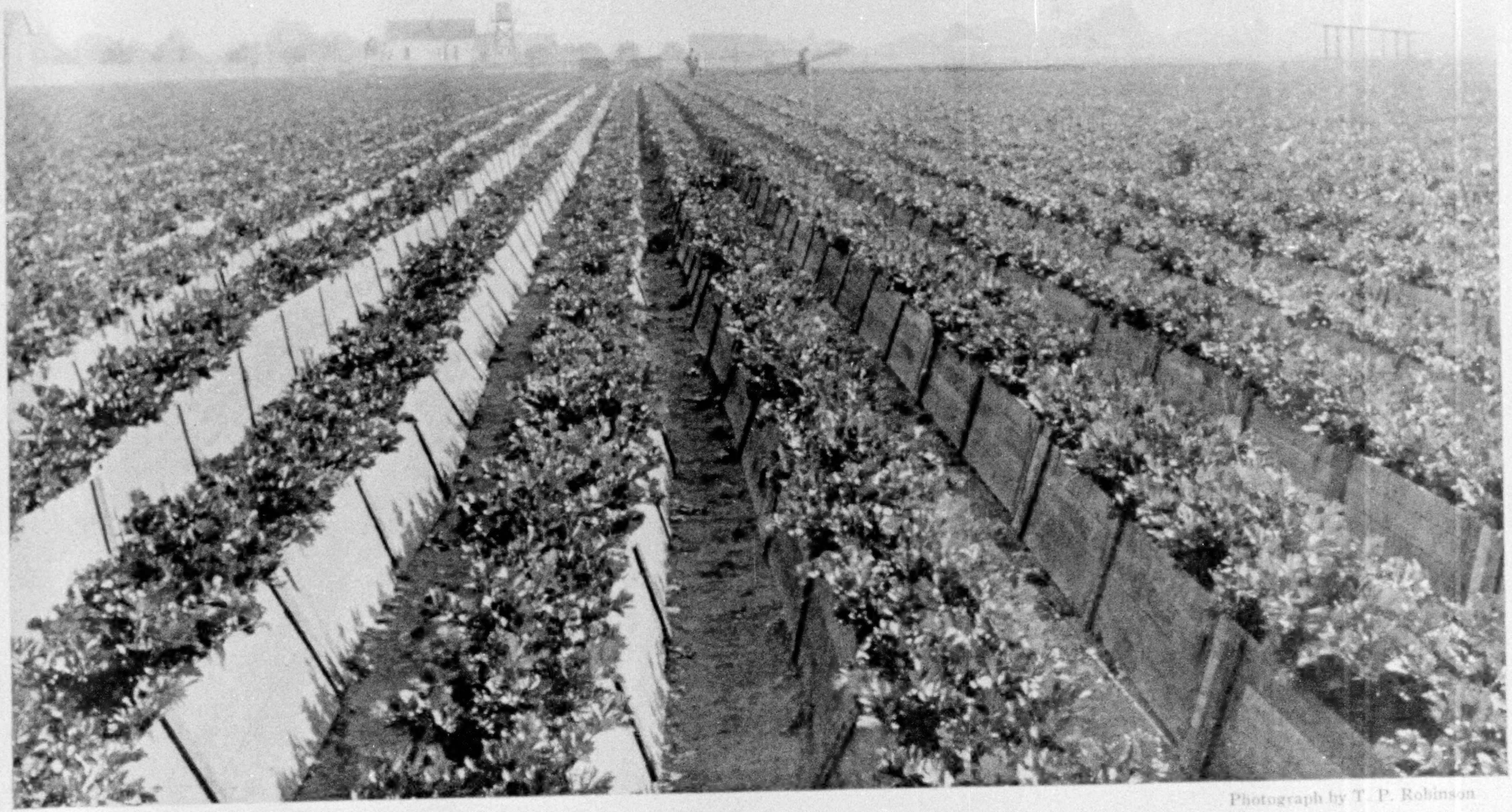

Photograph by T. P. Robinson

A CELERY FARM IN MICHIGAN

Celery is a plant of recent domestication and is one of the acceptable immigrants of the vegetable kingdom which have come to our shores

Photograph by N. H. Darton

PICKING ORANGES IN CALIFORNIA

Because of the great freeze of two decades ago and the competition of the spirited Western growers, Florida has been forced to yield first place in the orange industry to California

Pittsburgh. Three-fourths of this is grown in Brazil, a country that has become rich from its coffee industry alone. Europe and North America bear approximately the same relation to the consumption of coffee that Brazil does to its production, these two continents using nearly four-fifths of all the coffee the world produces.

Holland is the greatest coffee-drinking nation on the globe. It uses 15⅛ pounds per capita annually, while we use 9½ pounds, Germany 5⅛ pounds, Austria-Hungary 2⅖ pounds, and the United Kingdom ⅔ of a pound. On the other hand, we use less than one pound of tea per capita, where the United Kingdom uses nearly seven pounds. Canada is about two-thirds English and one-third American in its use of coffee and tea; it shows a decided preference for the tea, but drinks less of it than the mother country, making up the difference with coffee. The Germans and the Austro-Hungarians use only a negligible quantity of tea.

The coffee plant is a shrub which, under cultivation, grows from 4 to 6 feet high. In its wild state it grows three or four times as high as in its cultivated state. The dwarfing of the plant increases the crop and facilitates picking. The leaves are of a fresh green color; the flowers are white and have an odor strongly resembling jasmine.

The green coffee berry of commerce is nothing more nor less than the seeds of the coffee "cherry." These "cherries"

Photograph by Curtis & Miller

A BRANCH OF JONATHANS: YAKIMA VALLEY, WASHINGTON

From the days when Andrew Stevenson, American minister to the court of St. James, presented a lot of Albemarle pippins to the Queen of England, America has always produced apples fit for any queen. Our apple crop is worth several times as much as the banana crop of both the Americas.

Photograph by Curtis & Miller

TOKAY GRAPES: PACIFIC COAST FRUIT BELT

"California's supremacy as a grower of the newer crops is shown all along the line. Out of the nation's 6,793,000 pounds of almonds, that State grows 6,692,000 pounds; out of 4,150,000 bushels of apricots, it shows a production of 4,066,000 bushels; out of 35,000,000 pounds of figs for the entire country, 23,000,000 belong to her credit; out of the country's total of 2,571,000,000 pounds of grapes, California is credited with 1,979,000,000 pounds" (see text, page 79).

turn crimson on ripening. They are then picked, the pulp is taken off by machinery, and the two husks which lie between the pulp and the seeds themselves are removed. The coffee has to be thoroughly dried before the husks can be taken off, and on many plantations there are whole acres of concrete floors for this drying process.

When run through the machinery for the removal of the husks, these latter are blown away like chaff, and the coffee grains are run over sieves so arranged as to grade them and bag them according to size, ready to be shipped to the world's markets.

PRODUCTION OF TEA

The growing of tea is largely an Asiatic industry. The tea plant is a hardy evergreen shrub, growing from 12 to 15 feet high in its wild state, but dwarfed under cultivation. It prefers a subtropical climate where the rainfall approximates 50 inches a year. After the leaves are picked the tea reaches its commercial state by two routes—one producing the black variety of the tea and the other the green.

The leaves are first dried in the sun in the case of black tea, and in pans over fire in the case of green tea. In both processes the leaves are next rolled until soft. Black tea is next fermented, then fired, and finally sorted. Green tea is withered again following the rolling process, sorted into bags, and then slowly roasted.

In China most of the tea gardens are

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small, each farmer producing enough for the consumption of his own family, and a little surplus which he sends to the market. The Department of Agriculture has interested itself in the production of tea in this country, and has issued a bulletin which reveals the fact that in South Carolina and elsewhere on the southern Atlantic seaboard America has proved a successful grower of this plant.

THE BANANA INDUSTRY

It is not so many years ago that the banana was a tropical crop, grown only for home consumption by residents of the river valleys of the tropical countries. It was sold mainly by street venders in the villages and towns, and only in exceptional cases did any reach American and European markets; but today we are importing more than 40,000,000 bunches of bananas into the United States every year, and the value of these importations ranges around $14,000,000.

The first bananas ever importel came in 1869, and in many parts of the country it was twenty years later before they came to stay. It has been only in recent years that the banana reached Europe. England now buys about 7,000,000 bunches a year (see page 89).

A visit to a banana plantation is an interesting experience. The banana tree wants a rich soil; but, given that, no other tree known can grow faster. In preparing a banana plantation, the jungle is first cut down, and sprouts are planted in rows about six feet apart. By the time the tree is ready to bear, every bit of the jungle debris has disappeared, except that here and there an occasional hardwood tree still lies prone upon the ground. One can scarcely believe his eyes when he sees how quickly the processes of decay so nearly obliterate the last vestige of the felled tropical jungle.

Each tree grows one bunch of bananas. When they have reached maturity, but are still green, the tree is cut about half way up its trunk, and the upper part falls gently into the hands of the banana gatherers. The bunches of green bananas are put on hand-cars and hauled to central places, where the banana trains come along and pick them up.

SINGING AS THEY WORK

I have seen 35,000 bunches of bananas loaded into the hold of a ship in a single night, the West Indian negroes singing after the fashion of the hand-drill gangs on railroad and other construction work in the United States. The people who handle bananas on the big plantations of Central America and the West Indies so lose their taste for this fruit that they seldom keep them on their tables at all.

Once I was on one of the biggest plantations in the world, in Guatemala, and, although there must have been several hundred thousand bunches on the trees that were in sight, there was not one ripe banana around the entire settlement of the plantation headquarters.

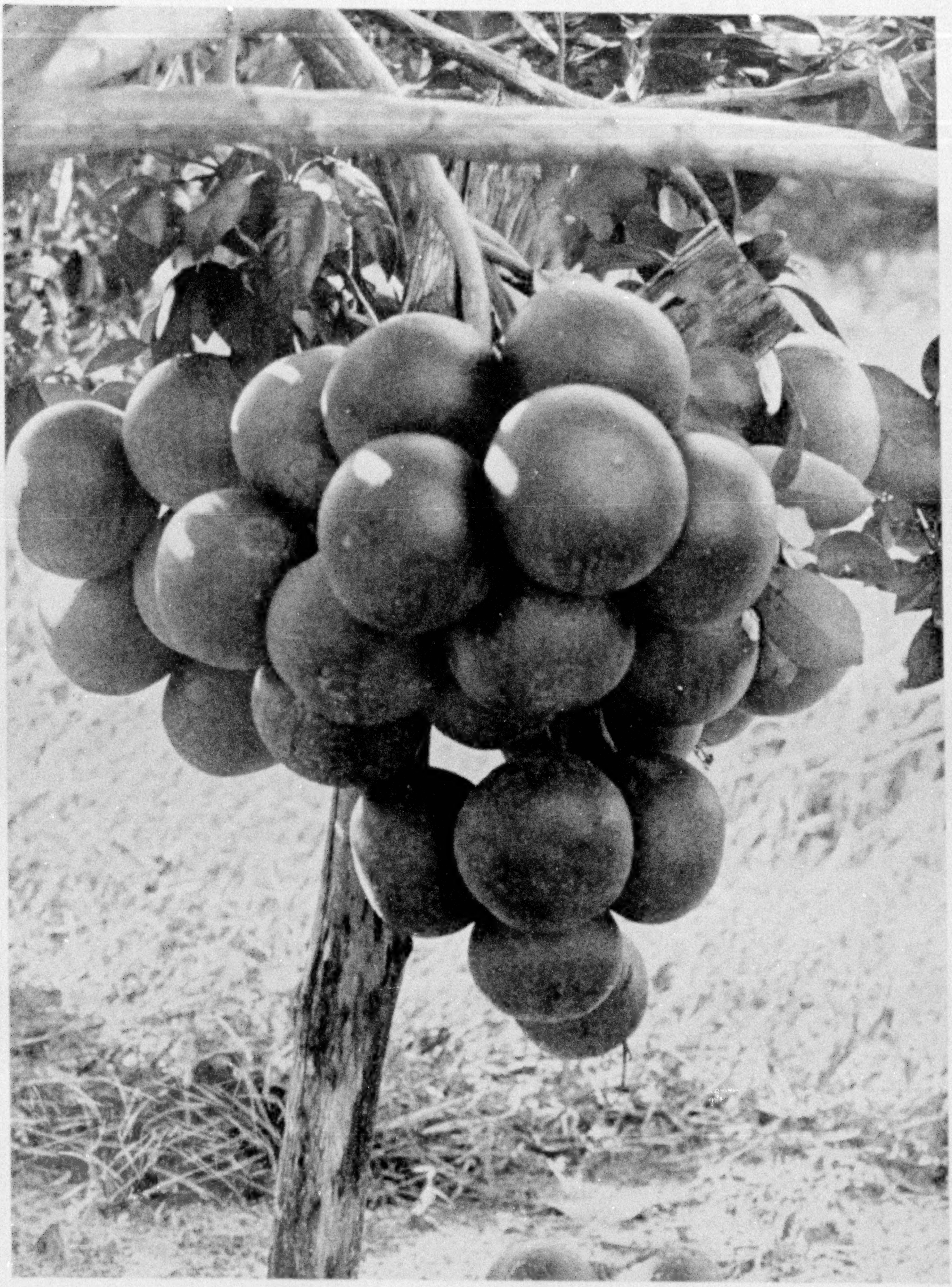
The banana and its cousin, the plantain, are found in most tropical countries. To the native of Central Africa they yield not only a part of his food and some of his drink, but he gets from them his string, his soap, and his clothing.

He cooks the green fruit of the plantain as a vegetable, and serves the ripe fruit as a dessert. With the banana he makes his flour and sometimes his coffee. He uses the leaves to thatch his house, and also makes them serve him for paper, table-cloths, and napkins. He often uses the stems for fences, the pith as a sponge, and the fiber as a string.

THE PINEAPPLE

Another native of America that has won favor in every part of the world where it is known is the pineapple. Jack Frost is its deadly enemy; therefore it grows only in tropical and subtropical communities; but the refrigerator ship has enabled it to wander to every point of the compass where men and women who love good things to eat are to be found.

Hawaii leads the world in the production of pineapples. It has brought to its fields every variety of this luscious fruit that might add, by cross-breeding, to the size and flavor of its product, so that today canned Hawaiian pineapple and raw Hawaiian sugar serve largely to keep the American flag on the high seas in Pacific waters (see page 88).



Photograph by T. P. Robinson

A BUNCH OF GRAPEFRUIT

Some one has pronounced a grapefruit a lemon that has had a chance. However that may be, Florida finds that they have given her a chance to add $2,000,000 a year to her income.

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GATHERING DATES IN ARIZONA

The date was one of the earliest arrivals of all of our plant immigrants, having been brought to America by the Mission Fathers and given a foothold in Arizona and California. While these two States produce a considerable crop of this luscious fruit, still we import the major portion of our supply.

Photograph and copyright by Underwood & Underwood

STRAWBERRIES RIPEN EVERY DAY OF THE YEAR IN SOME PARTS OF CALIFORNIA AND MEXICO

Irrigation, peace, and good farmers would make Mexico a granary of plenty. A touch of water to its thirsty highland soil transforms desert into garden.

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Photograph by A. W. Cutler

FORBIDDEN FRUIT: ENGLAND

Adam and Eve and the apple. When Adam got the apple back, there was not much left but the core.

Some plantations are found in Florida, but the frosts frequently nip them there, so they are often grown under sheds to guard them from the cold. The pineapple contains vegetable pepsin, and there are many cases of derangements of the stomach in which it is a valuable aid to the physician.

The orange, the lemon, and the grapefruit are grown where the pineapple thrives, and sugar-cane grows there, too. Traveling through our busy little island, Porto Rico, orange and lemon groves alternate with sugar plantations and pineapple fields. When one comes to the upland region, the coffee "finca" takes the place of the pineapple field, for coffee is the most fastidious of all plants; it will not thrive in the lowlands, and it refuses to grow well at points having too much elevation.

THE OLIVE'S POSITION

If one should draw a ring around the Mediterranean Sea back a hundred miles or so from the shore, and another around southern California, he would circumscribe the two great olive-producing regions of the earth. Although the olive is said to have come originally from Asia Minor, Italy now grows more of them than any other country, while Algiers, Tunis, France, Spain, Greece, and Asia Minor still give important contributions to the world's crop.

The olive tree has been imported to America, and has thrived well in our southern Pacific regions. There are trees in California which were planted before we signed our Declaration of Independence, and they are still bearing well. California's contribution to the world's olive crop is about 56,000,000 pounds a year.

In southern Europe there is a saying that the man who plants olive trees lays up riches for his grandchildren, and many of the people claim that olive trees often live a thousand years.

The trees are planted from cuttings, sprouts, or the gnarled wooden bulbs at the base of the trunk. They are set about 40 feet apart and begin to bear at two or three years of age, although it requires seven years for them to become commercially profitable. They do not reach their maximum bearing qualities until about thirty years old. A ten-year-old tree may have six or seven gallons of olives on it, while one thirty years old may produce as many as fifty gallons.

In southern Europe and in other lands around the Mediterranean Sea, olive oil to a large extent takes the place of butter. It is used not only in salads, but upon bread and for cooking vegetables. In some localities ripe olives and green oil take the place of both bread and meat. Many a Spaniard, when upon a long journey, ties a wicker basket of olives to his saddlehorn and eats his meals as he travels.

CALIFORNIA'S PREËMINENCE

The systematic growing of nuts is a comparatively new industry in the United States, yet it is one that promises to develop into an important source of food in the future. At the last census there were five million nut trees in bearing in the United States and more than three million more approaching a bearing age. They produced a total of 62,000,000 pounds of nuts, having a value of nearly five million dollars—approximately a dollar a tree.

English walnuts took the lead in weight produced, giving nearly one-third of the total weight and one-half of the total value. The pecan led in the number of trees, with nearly one-third of the total in bearing and more than one-half of the total too young to bear; but they contributed only one-sixth of the total production in weight and one-fifth in value.

California's supremacy as a grower of the newer crops is shown all along the line. Out of 6,793,000 pounds of almonds grown in the entire country, that State grows 6,692,000 pounds; out of 4,150,000 bushels of apricots, it shows a production of 4,066,000 bushels; out of 35,000,000 pounds of figs for the entire country, 23,000,000 belong to her credit; out of the country's total of 2,571,000,000 pounds of grapes, California is credited with 1,979,000,000 pounds.

Practically all of the country's lemons come to us from that State, as does nearly half of the total nut production; nearly all of the country's 16,405,000-pound olive crop; more than two-thirds of the total crop of oranges, amounting to 19,405,000 boxes; a fourth of the peaches and nectarines, and 9,317,000 bushels of plums and prunes out of the country's total yield of 15,480,000 bushels.

SUNFLOWER-SEED OIL

In Russia the people have found the seeds of sunflowers a substitute for olives in the making of oil. The native Russian eats sunflower seeds as we eat peanuts, keeping a handful or so in his pocket and nibbling away at them from time to time. Each sunflower has from eight hundred to one thousand seeds and about forty million pounds of them are raised every year.

An acre of sunflowers yields about sixty bushels of seeds, and these, when pressed, produce about fifty gallons of oil. The Russians use sunflower-seed oil almost exactly as we use cotton-seed oil, only they make a greater use of it as a substitute for olive oil than we do. Much of the oil is used for lighting and making candles and soaps.

The date is largely an around-the-Mediterranean crop. It is grown by irrigation in the oases of the Sahara Desert, in the valley of the Nile, in the fertile

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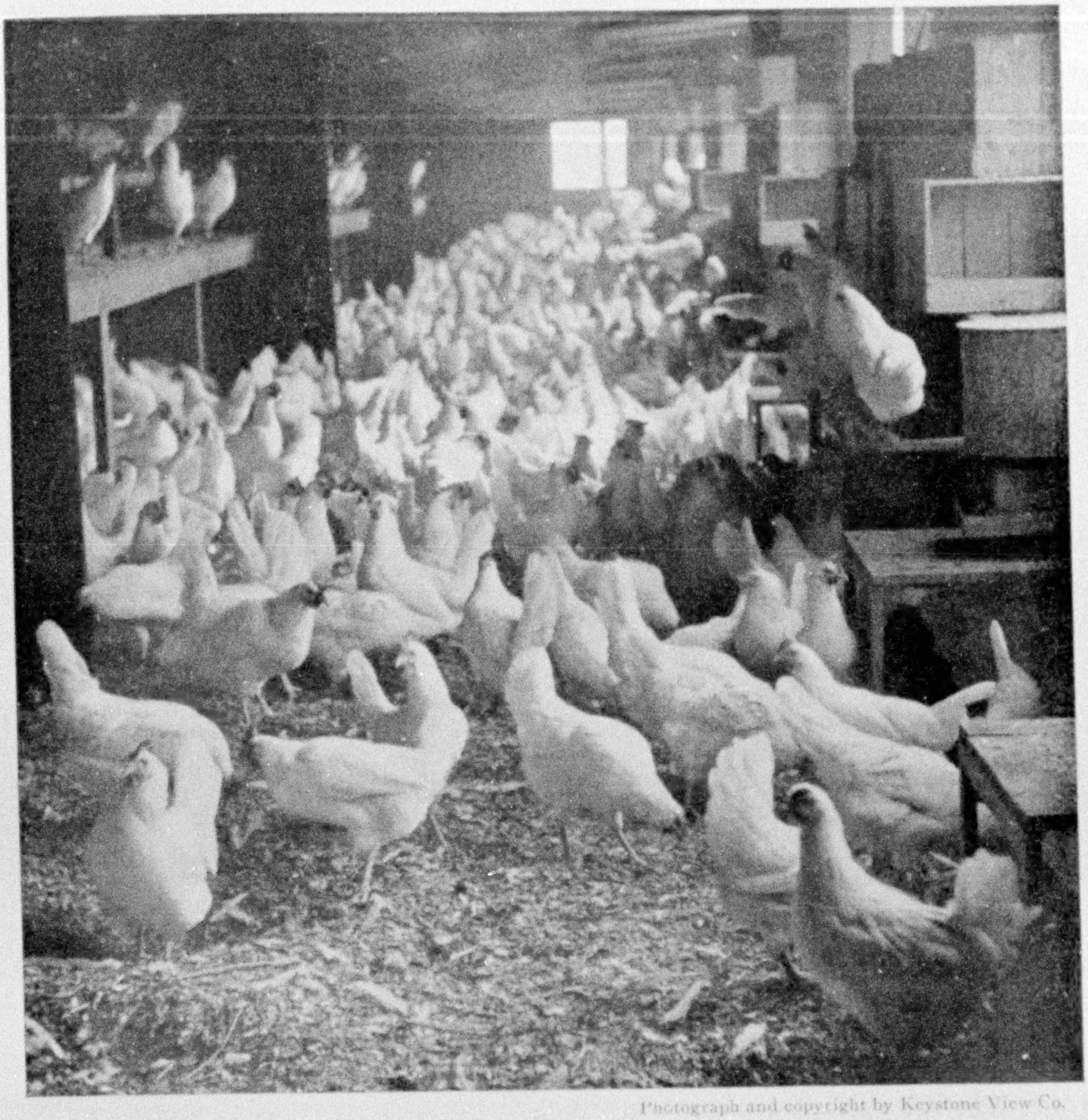


Photograph and copyright by Keystone View Co.

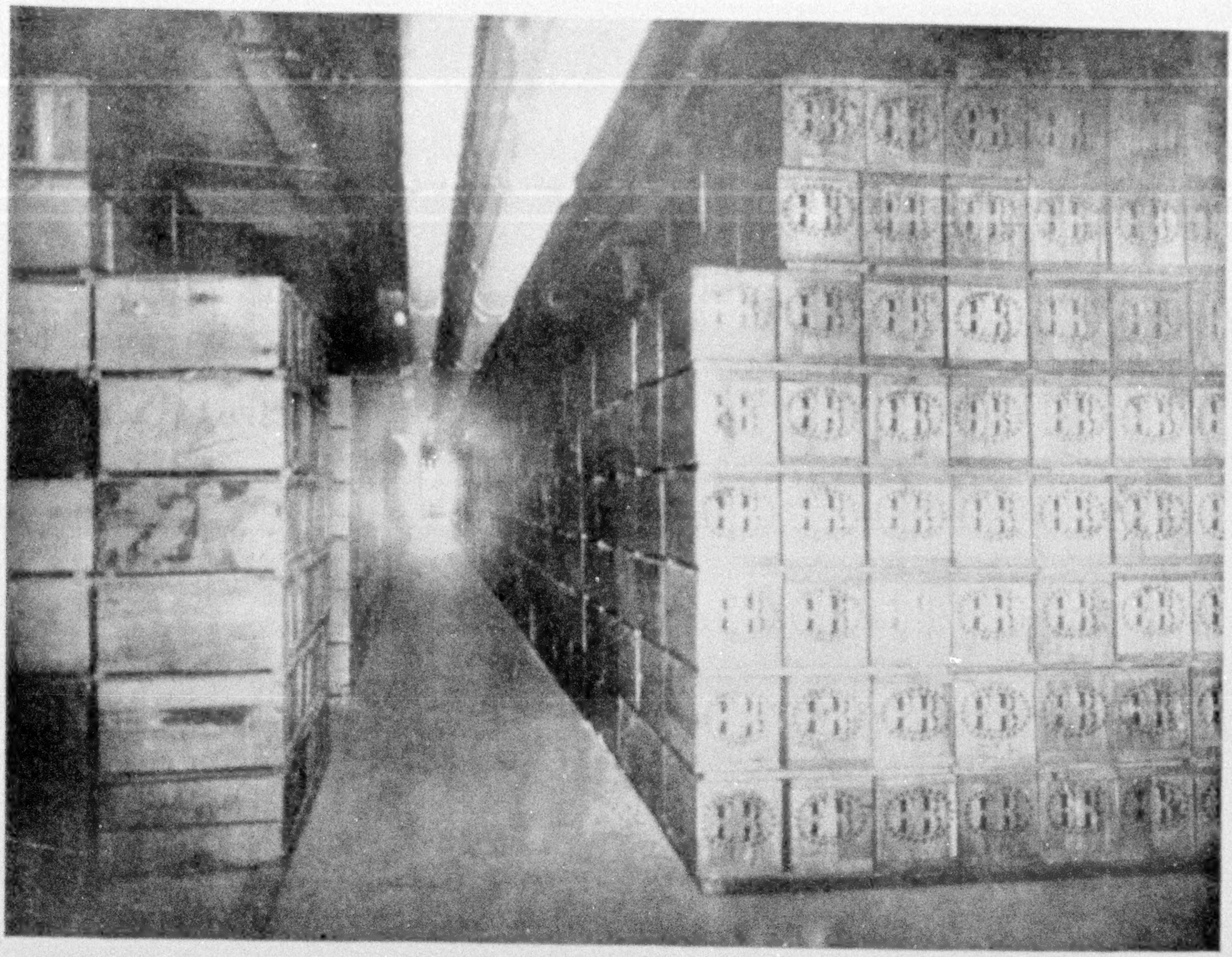
SCENE IN A MODERN HENNERY

The American hen could finance the digging of a Panama Canal every year. She presents the country with twenty billion eggs and nearly half a billion young chickens annually.

spots of the desert of Arabia, and especially along the Shat-el-arab River, at the head of the Persian Gulf. This river is formed by the union of the Tigris and Euphrates, and it flows from their junction for a distance of 70 miles to the Gulf of Persia through some of the richest soil and one of the hottest climates in the world. Here the date palm thrives as nowhere else, and practically the whole land is given up to its cultivation. The date has been in America for generations, having been carried to our southwestern country by the Mission Fathers along with the olive. When grown systematically, it has rewarded those who have cultivated it with fair returns (see page 76).

SPICES AND FLAVORS

The orchid family not only yields some of the most beautiful flowers of which we know, but it also produces one of the most used of all the flavoring agents that figure in the art of cooking. Vanilla is made from the fruit of a climbing orchid, a native of tropical America, but now grown in Java, Ceylon, and other parts



Photograph and copyright by Underwood & Underwood

THE HOME OF THE COLD-STORAGE EGG

of the Orient. The Asiatics use it to flavor their chocolate.

The fruit is a pod. This pod is dried and cured with great care in order to obtain the desired flavor. The characteristic odor is developed during the process of fermentation, which takes place while the pods are drying. The aroma and flavor are due to the vanillin that gradually crystallizes from the pod. The well-cured pods, either whole or powdered, may be found on the market as the vanilla bean or powder; but the more common form is the fluid extract, which is the active principle of the bean drawn out by the use of alcohol.

The American people are the largest users of pepper in the world. In 1913 we bought 27,000,000 pounds of this commodity. It is said that pepper was worth its weight in gold during the days of the Roman Empire, and that the first vessel which sailed around the Cape of Good Hope went to procure this favorite spice. The black variety is prepared from the dried unripe berry of a vine which was grown first in southern India, the East Indies, Siam, and China, and in the later ages in the West Indies. For a long time the Dutch nation controlled the trade and tried to confine pepper cultivation to Dutch possessions.

White pepper is generally supposed to be produced from a different spice, but it is, in reality, the same fruit prepared by a different method. It is generally considered better, but, as a matter of fact, it has not as good a flavor as the black variety and is more expensive, the only advantage being in the matter of appearance.

CINNAMON AND CLOVE GROWING

Cinnamon is the inner bark of young shoots of a certain species of cinnamon tree. The shoots are cut carefully from the tree, and the bark is split longitudinally and removed. It is then piled in heaps and allowed to ferment. The bark shrinks on drying, and is then put into bundles ready for exportation.

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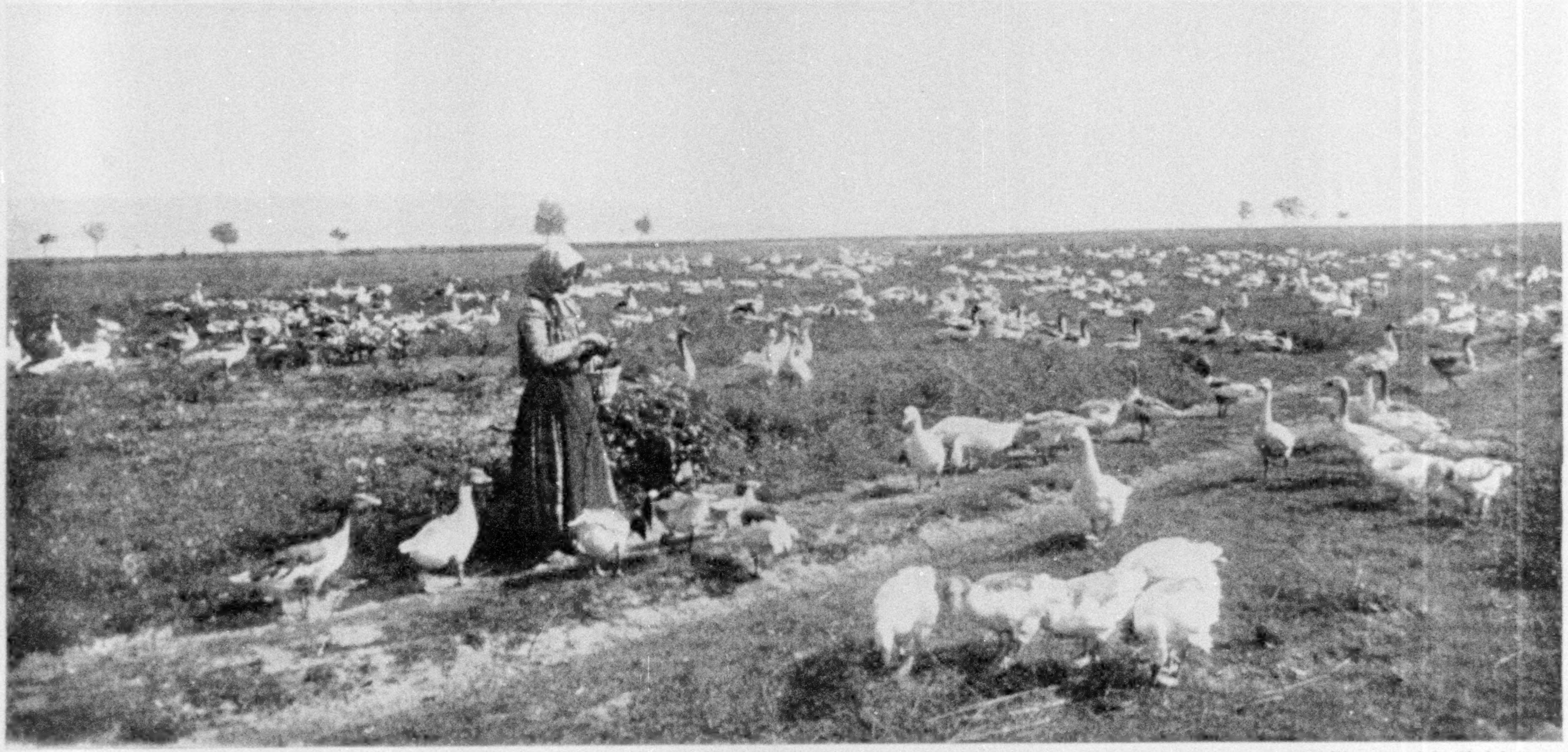

Photograph by Erdelyi

GOSHERD ON THE BANKS OF THE TISZA: HUNGARY

The goose is much more frequently reared in Europe than in America. It is a bird that has so lately been domesticated that it is still in Europe called the "lag" goose, bringing back to mind the time when some of them "lagged" behind in the days of their migration and permitted themselves finally to be domesticated.

Photograph by A. W. Cutler

PEASANT WOMEN READY TO START TO MARKET: MEZOKOVESD, HUNGARY

Cloves are the unopened flower buds of a beautiful evergreen tree which grows mainly in the Spice Islands. After picking, the buds are thrown on grass mats on the ground and allowed to dry in the sun, care being taken to shelter them from the dew at night. In about one week they are ready to be packed for exportation. They contain about 16 per cent of a volatile oil which is used largely in the manufacture of perfumery, soaps, and candles.

The nutmeg is the dried kernel of the seed of the fruit of a tropical tree somewhat resembling the orange tree. It is a native of the Malay Archipelago, but is also grown largely in Asia, Africa, South America, and the West Indies. The fruit is gathered when fully ripe, and, as in the case of coffee, the pulp is discarded. The seeds are then dried in the sun or by artificial means. Later the outer coating is broken and the nutmeg or kernel taken out. The outer coating is also used commercially, being exported under the name of mace.

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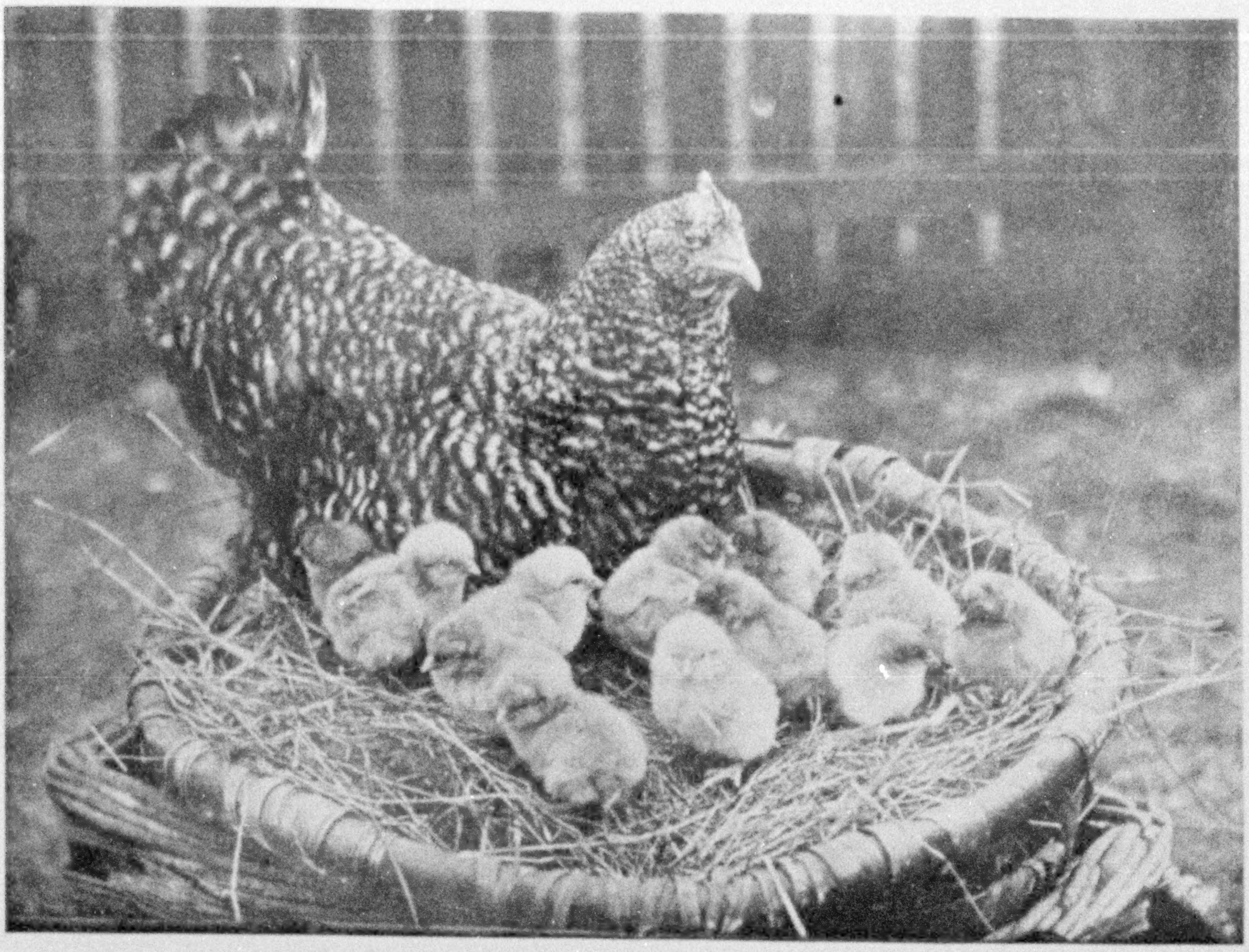
A DROVE OF KANSAS TURKEYS

The heavy draft that Thanksgiving and Christmas makes on the turkey flocks of the country is shown by the fact that the opening of spring finds less than four million alive in the whole United States. Texas is the foremost turkey State, with Missouri ranking second. The American farmer told the census enumerator in 1910 that his turkeys were worth $1.79 each.



Photograph from Henry Ruschin

BUSY BIDDY AND HER BROOD

Sago is made from the pith of the sago palm. This pith is ground into a meal, and the extracted flour, when dried and roasted, becomes the pearl sago of commerce. In many tropical countries the bamboo takes the place of asparagus. The tender shoots of the bamboo are boiled, stewed, or pickled in vinegar.

OTHER TROPICAL PRODUCTS

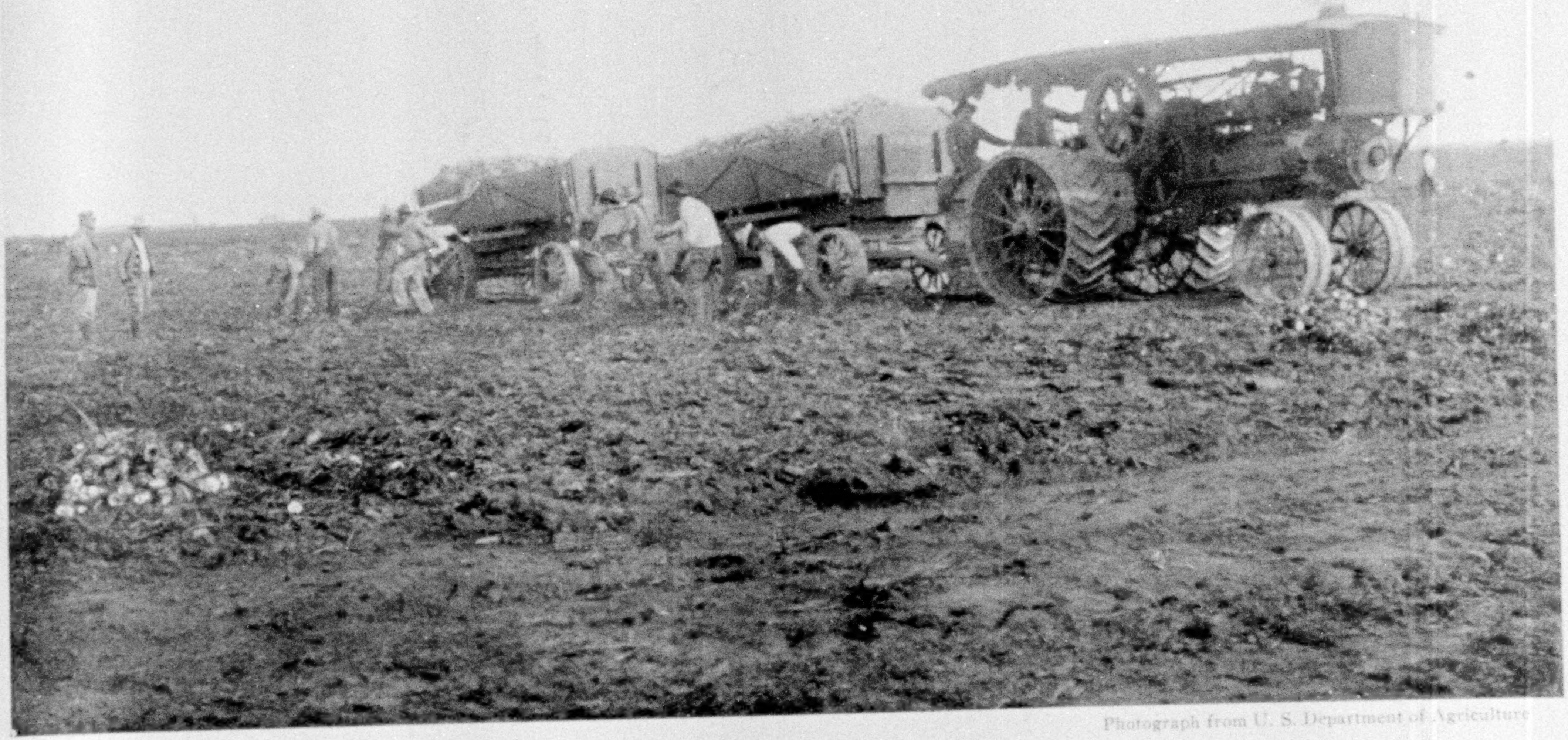
Tapioca is prepared from the starch of the cassava, a plant grown largely in Brazil and other tropical countries. The starch is extracted, put into shallow pans, and subjected to a low heat. As the moisture is driven off, the heat is gradually raised until the mass forms into irregularly shaped kernels. The cassava plant is closely akin to our own milkweed.

Cocoa is grown on trees which reach an average height of from 20 to 30 feet. The fruit is a pod possessing a thick, tough rind inclosed in a mass of tissue. Embedded in this tissue are some forty or more cocoa beans covered with thin shells. The pods are picked when fully ripe and the seeds extracted and sent to market.

SOME OF THE EARTH'S FREAK FOODS

There is no accounting for the freaks of human appetites. The Roosevelt story of how he got the best work out of the men with sharp-filed teeth by promising them the choicest bits of raw hippopotamus and rhinoceros steak for speed in skinning, will be recalled by many who read the article in the magazines at the time of his African expedition. Capt. Robert H. Bartlett, commander of the *Karluk*, which carried Stefansson to Arctic waters, says that on his return from Herald Island to northern Siberia, he found raw Polar bear meat tasting better than any piece de resistance he had ever eaten in the home country.

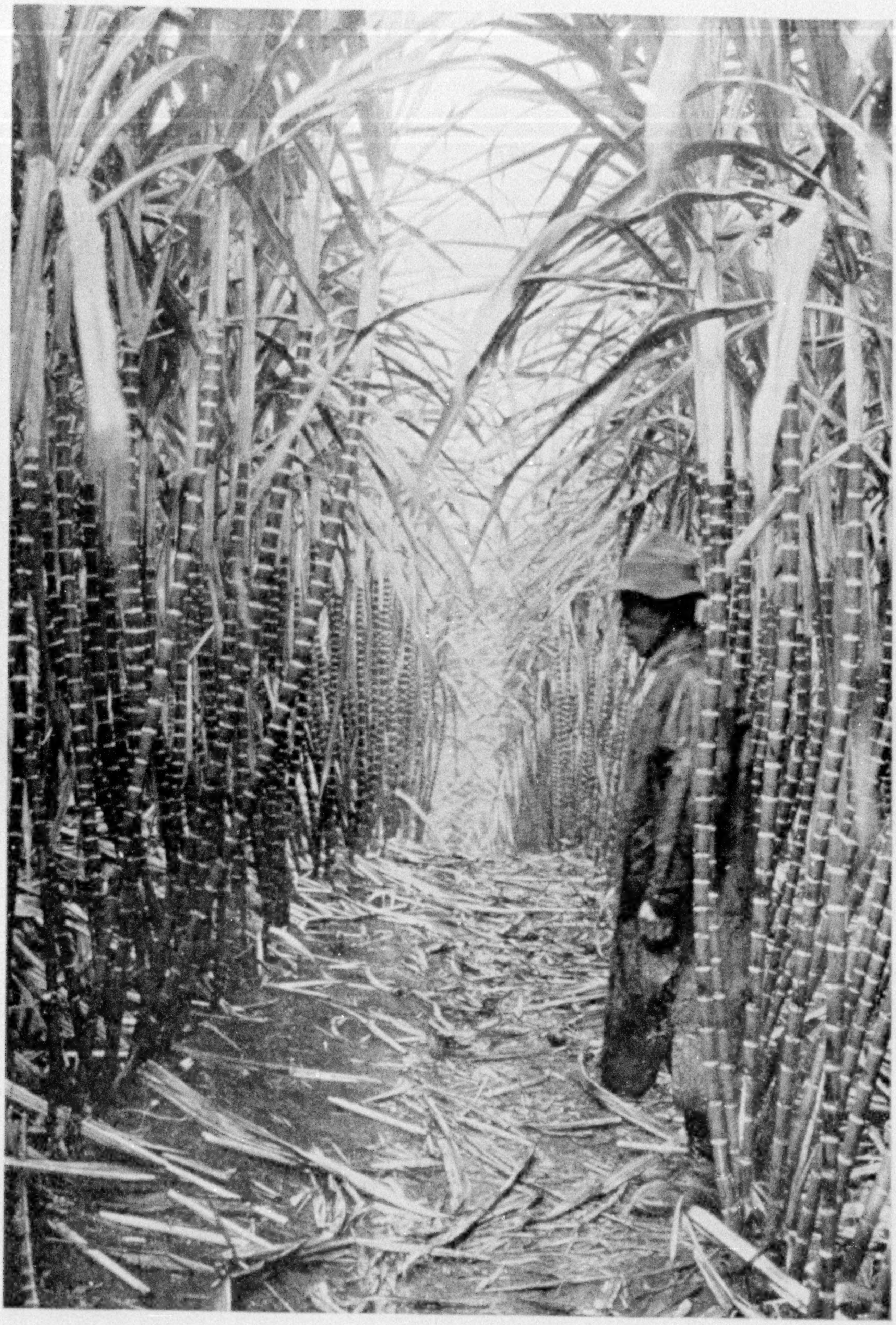
The Frenchman likes his snails and wonders how any one who accepts oysters can refuse them. In Canton, China, rats sell for fifty cents a dozen, and a dog steak brings more per pound than a leg



Photograph from U. S. Department of Agriculture

STEAM TRACTION ON A SUGAR-BEET FARM

The sugar beet demands a rich, level soil, which permits the use of every kind of heavy agricultural machinery in the cultivation and harvesting of the crop



Photograph by A. Nielen

A HAWAIIAN SUGAR PLANTATION

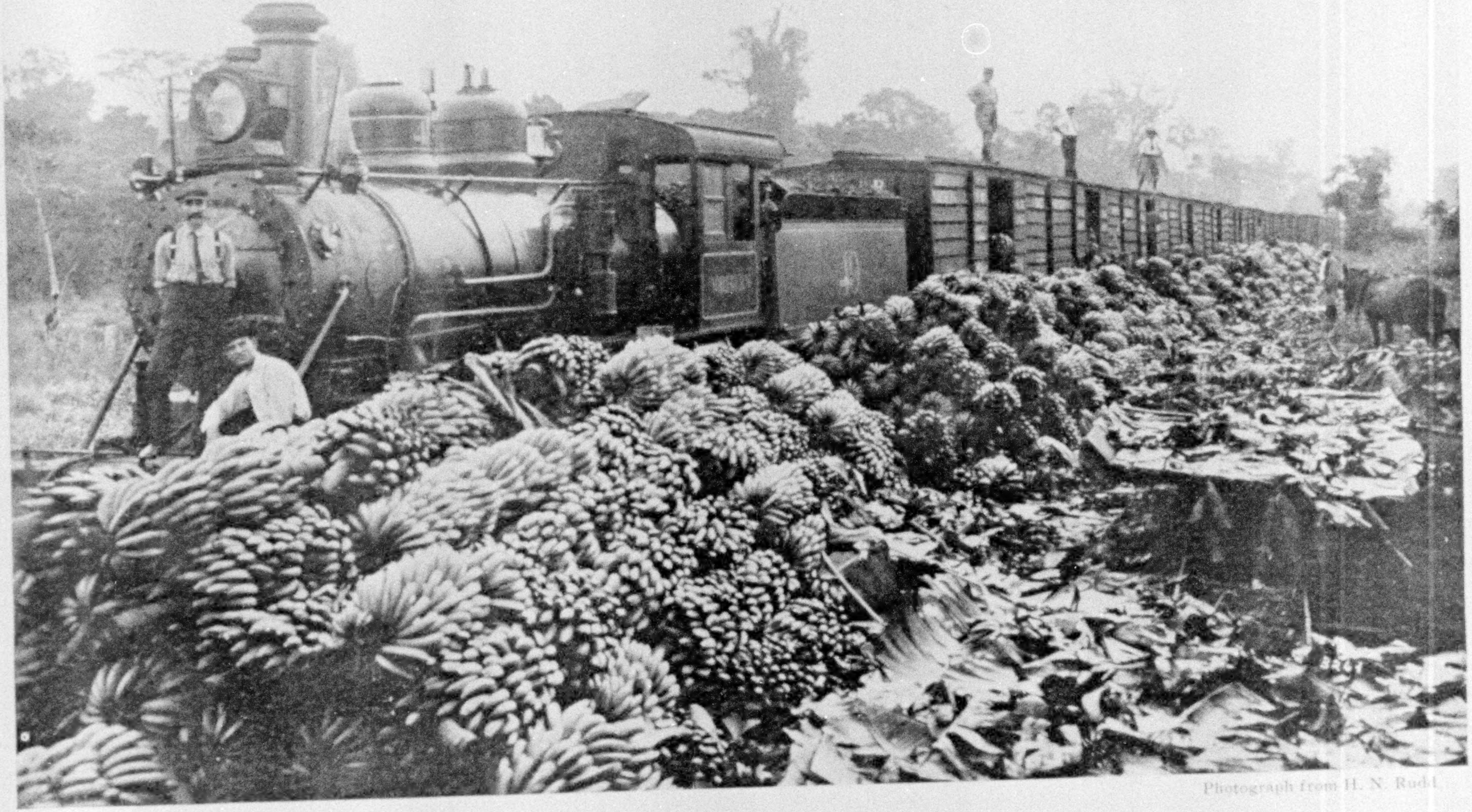
Hawaiian sugar was largely responsible for the building of the Tehuantepec Railroad across Mexico, and it practically keeps the American flag on the Pacific today. The Hawaiian sugar traffic through the Panama Canal takes high rank among the commodities handled.

XUM

Photograph by R. W. Perkins

A PINEAPPLE FIELD: OAHU, HAWAII

Hawaii has ransacked the tropical world for varieties of pineapples which could be cross-bred for the improvement of the size and flavor of her crop. The result is that Hawaiian canned pineapple has, because of its excellence, found its way into the home of almost every user of this delicious fruit (see page 74).



Photograph from H. N. Rudd

LOADING BANANAS: COSTA RICA

The banana is one of the greatest food producers per acre in the world. We annually import $14,000,000 worth. The banana trade engages more ships flying the American flag than any other business having a foreign end (see pages 7 and 74).

Photograph from U. S. Department of Agriculture

WHERE MILLIONS OF BUSHELS OF AMERICAN CEREALS COME FOR EXPORT: JERSEY CITY TERMINAL OF A GRAIN-CARRYING RAILROAD

of mutton. The Chinese mandarin pays thirty dollars a pound for the birds' nests from which his soup is concocted. In parts of the West Indies the palm worm is stewed in fat, while certain African tribes are as fond of caterpillars as an American is of reed birds on toast. The Turk is as disgusted with the oysters we eat as we are with the fish the Corsican relishes.

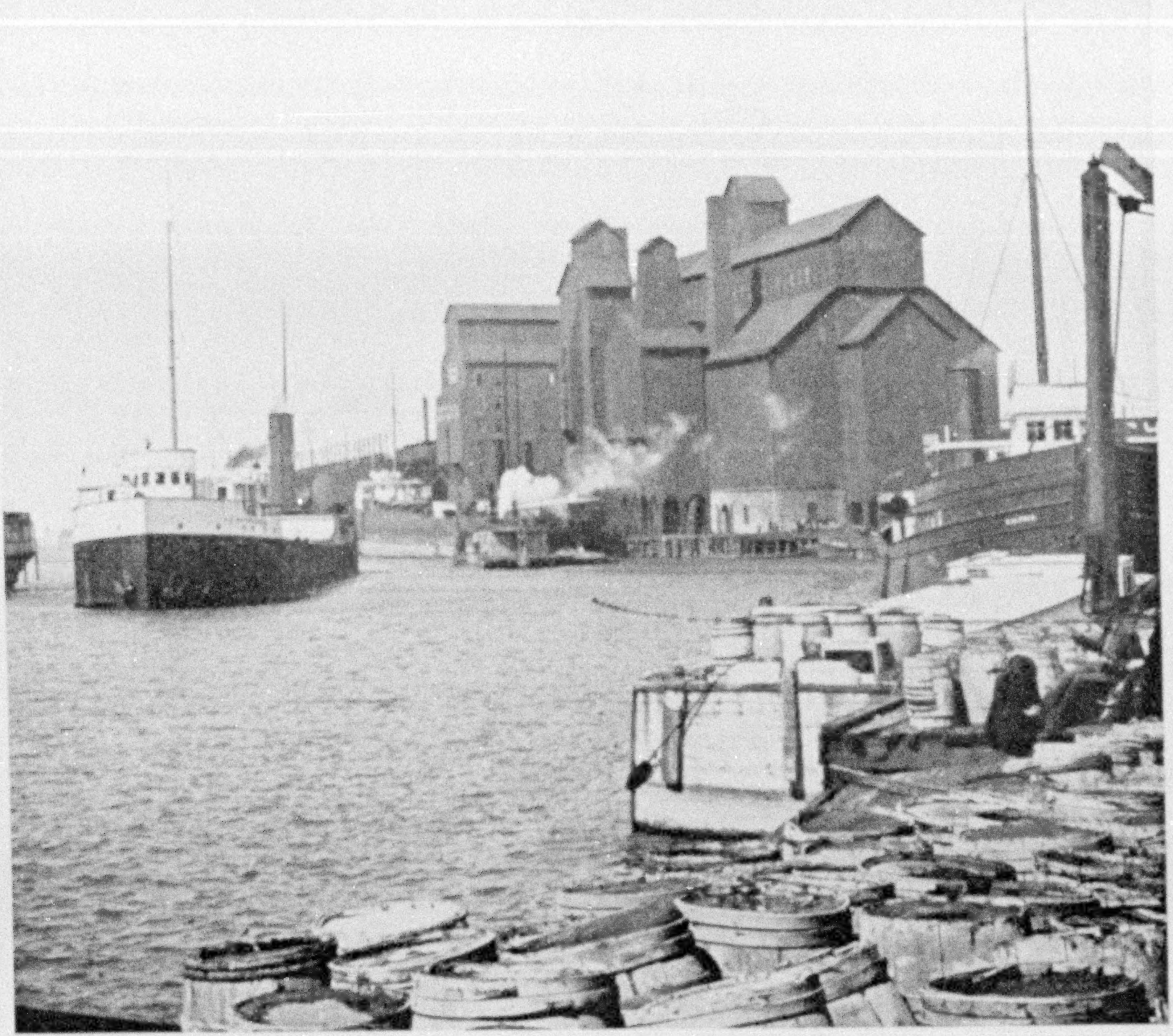
Eating earth, or geophagy, is a common thing in many parts of the world. In some parts of Europe a butter is made of fine clay, and in other regions various kinds of earths are sold in the open market. The Persians use some varieties of soil in making their sweetmeats, while in Mexico the eggs of certain species of flies are used by the Indians in making a food paste which is regarded as a great delicacy (see page 41).

FOOD IMPORTS AND EXPORTS

It is interesting, in view of war conditions in Europe, to study the figures of international trade as applied to the principal foodstuffs moving across the boundaries of the various nations.

According to the Department of Agriculture statistics, Austria-Hungary imported 29,000,000 bushels of corn in 1912, as compared with 8,000,000 bushels in 1911 and 3,000,000 bushels in 1910. Germany's importations of corn during the same years were as follows: 1912, 45,000,000 bushels; 1911, 29,000,000 bushels, and 1910, 23,000,000 bushels. In 1912 Germany and Austria-Hungary had a total importation of 74,000,000 bushels. During the same year Bulgaria and Roumania had a surplus of 75,000,000 bushels.

In 1912 Germany imported 85,000,000 bushels of wheat and flour, being the only one of the Central Powers to import such commodities. She exported 20,000,000 bushels of the same products. Bulgaria had a surplus of 14,500,000 bushels and Austria-Hungary a surplus of 1,000,000 bushels. Their neighbor, Roumania, had a surplus of 57,000,000 bushels that year. If the Central Powers get Roumania's wheat crop, they still have a wheat shortage of more than 12,000,000 bushels. If they do not get it, their shortage is 69,000,000 bushels.



Photograph and copyright by Keystone View Co.

MOUTH OF ERIE CANAL: BUFFALO

"Truly the man who dines well ought to be a deep student of geography, for all races, all nationalities, all types of people, all points of the compass, all latitudes—continent, island, river, and sea—all must come to him as he looks over the bill of fare and tries to find those things that delight his palate" (see text, page 107).

According to the Statesman's Year Book, Germany in 1912 had a surplus of rye, the net exports of that crop being valued at $22,000,000. On the other hand, she imported barley to the value of $100,000,000, corn to the value of $26,000,000, butter worth $40,000,000, and $28,000,000 worth of lard.

WORLD STARVATION AVERTED

The economists of a hundred years ago did not foresee the revolutionizing discoveries that were to come in the century ahead of them. They had no hint that it would go down in history as one of the most momentous of all the ages, from the standpoint of the world's food supply; for three discoveries in the field of food production, any one of which well might stand for a whole millennium of progress, were made by a single generation of men.

When Cyrus McCormick gave to the world the first reaper, he ushered in the age of agricultural machinery, enabling one man to do the work that required five before, and making him able to care for any crop the earth might give him. The world's production will never get too large for the machine-aided farmer to handle.

It was only a little while later that the great chemist Leibig worked out the principles of plant nutrition and introduced

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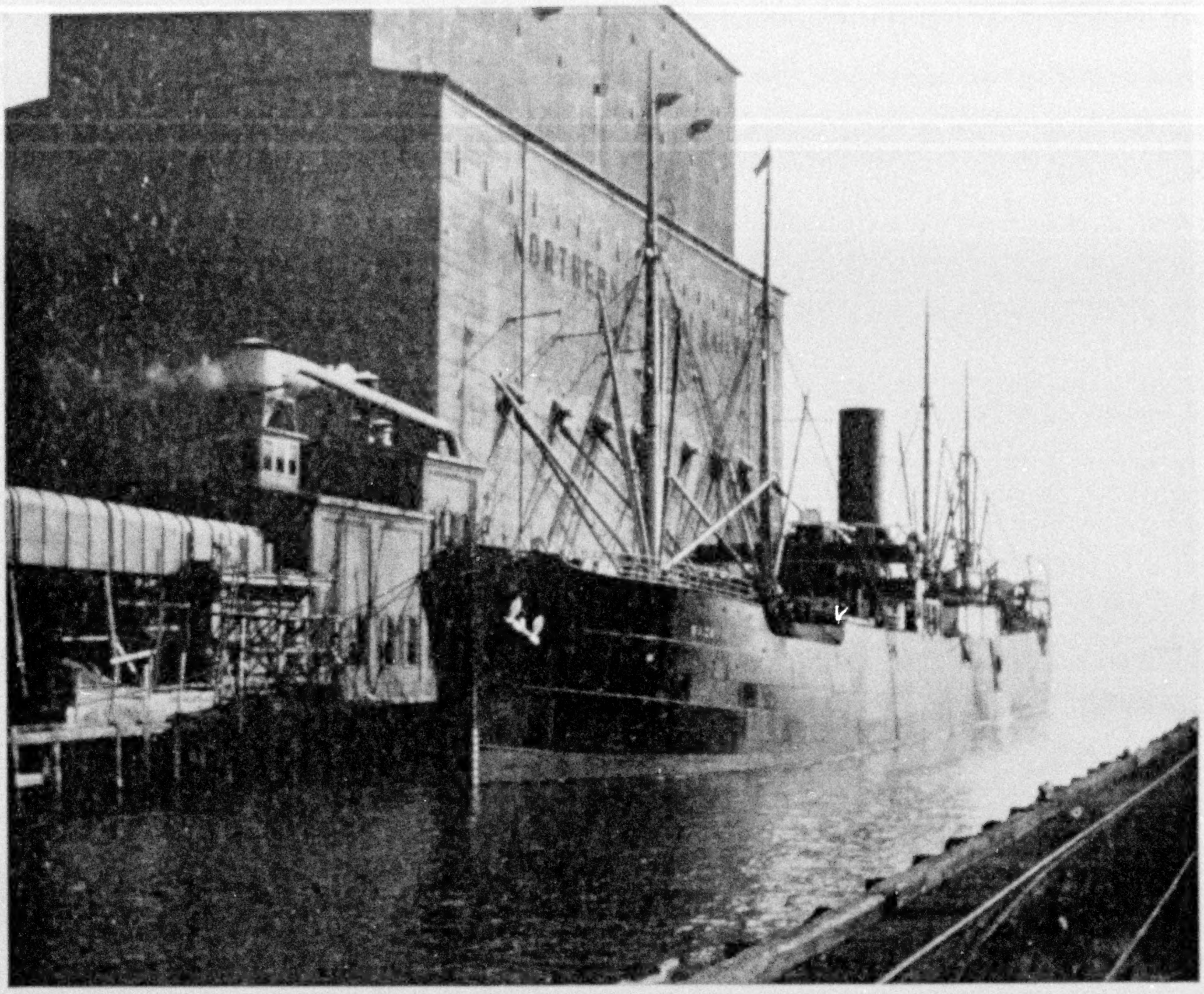


Photograph from U. S. Department of Agriculture

THE "BADENIA" TAKING ON A CARGO OF WHEAT FROM A BALTIMORE ELEVATOR

The long pipes extending from the elevator to the ship carry the wheat by gravity from its bins to the hold of the ship. In unloading, the grain is carried out of the ship by steam-driven endless belts of buckets. In 1913 the United States supplied the outside world with 92,000,000 bushels of wheat, 12,000,000 bushels of flour, 17,000,000 bushels of barley, and other breadstuffs in proportion.

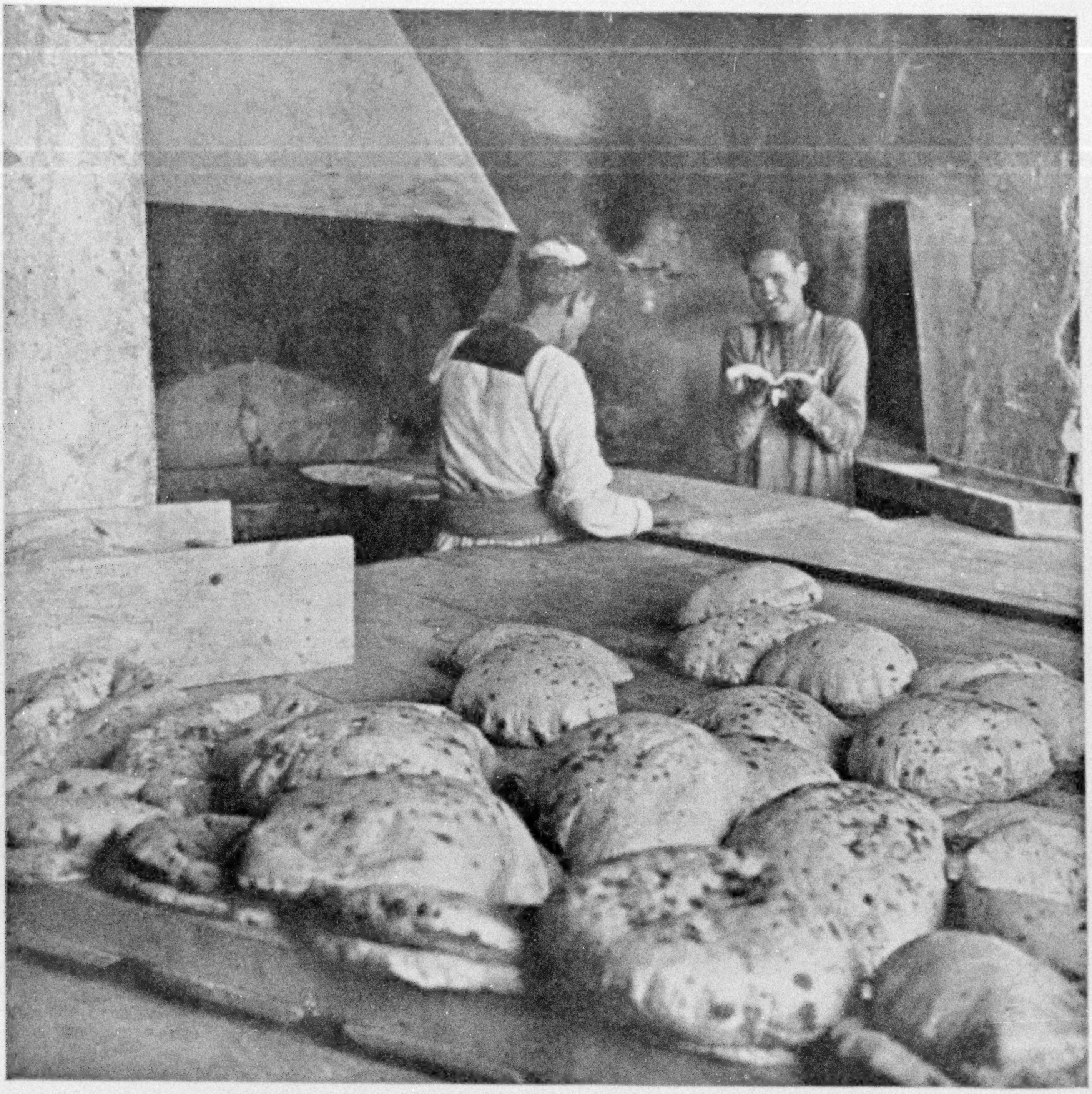
the era of commercial fertilizer. Before his discoveries were made, man had only an empiric control over the productivity of his land. He could only sow the seed and then trust to Providence for his harvest.

And he knew that every harvest saw his land less productive, for each crop drew its draft upon the bank of the soil and cut down the account of fertility just that much. It was a case of always drawing out and never putting in, and even nature's deposits must ultimately be exhausted under such a procedure. The result was that it began to appear that the agricultural machine would outlive its day, since soil exhaustion appeared inevitable and world hunger an unavertible calamity.

EXHAUSTION OF THE SOIL NEEDLESS

But when Liebig discovered that nitrogen, phosphorus, and potash are the only three indispensible articles in the menu of the plant, and that if it is given these it can thrive year after year and generation after generation on the same soil without impoverishing it, he laid the foundation of the new science of soil fertility—a science that permits man, through the use of proper fertilizers, to go on and on in developing and improving his ground.

Who that is a student of farming has not seen a run-down farm on one side of a line fence and a highly productive one on the other. I have known land to have its per-acre production of wheat increased threefold and its production of



Photograph and copyright by Keystone View Co.

A NATIVE BAKER AT WORK: ALEXANDRIA, EGYPT

The Egyptian baker's aim is to get the biggest possible loaf out of the smallest possible amount of flour, with the result that the bread of the Nile Valley is largely a hole wrapped in a crust. The material is rolled out like pie crust and the edges are joined all around. Heat puffs it up into a balloon of bread.

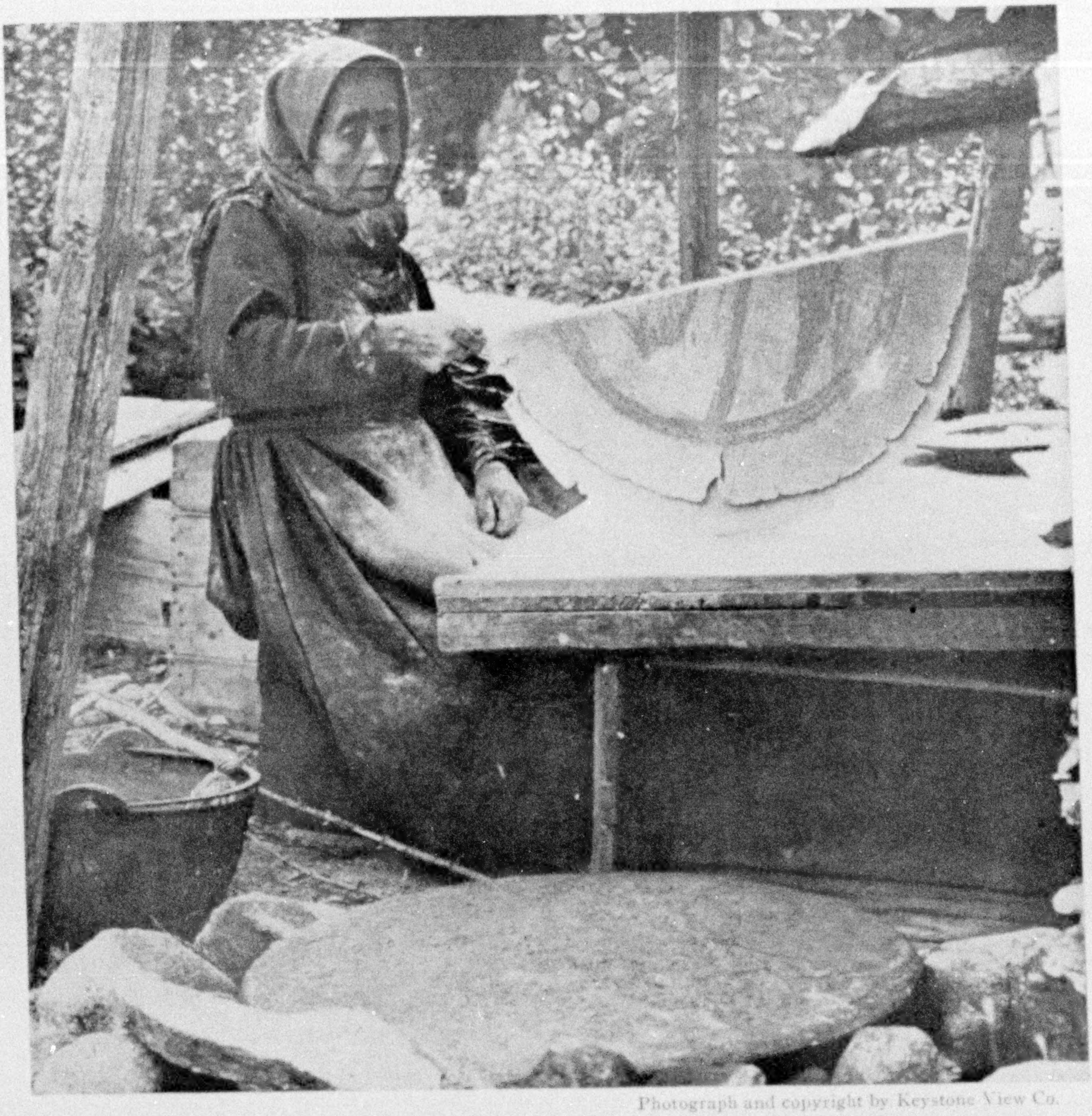
corn fourfold in less than five years, when it passed out of the hands of Peter Tumbledown and into the hands of his prosperous neighbor on the other side of the old line fence. And for a quarter of a century that land has been growing better with every crop rotation. It was the application of Liebig's discoveries that accomplished this result.

What, then, becomes of the argument of that school of thought which says that soil exhaustion is the lesson of all agriculture and all history?

The age of soil fertilization has confirmed to mankind the benefits of the age of agricultural machinery, and will enable the race to transmit them to his children and children's children for generations to come.

SAVING OUR MEAT SUPPLY

If McCormick taught the world how to sow and reap, so that unborn millions of people might have plenty, and if Liebig showed mankind how to insure themselves against the momentous evil of run-



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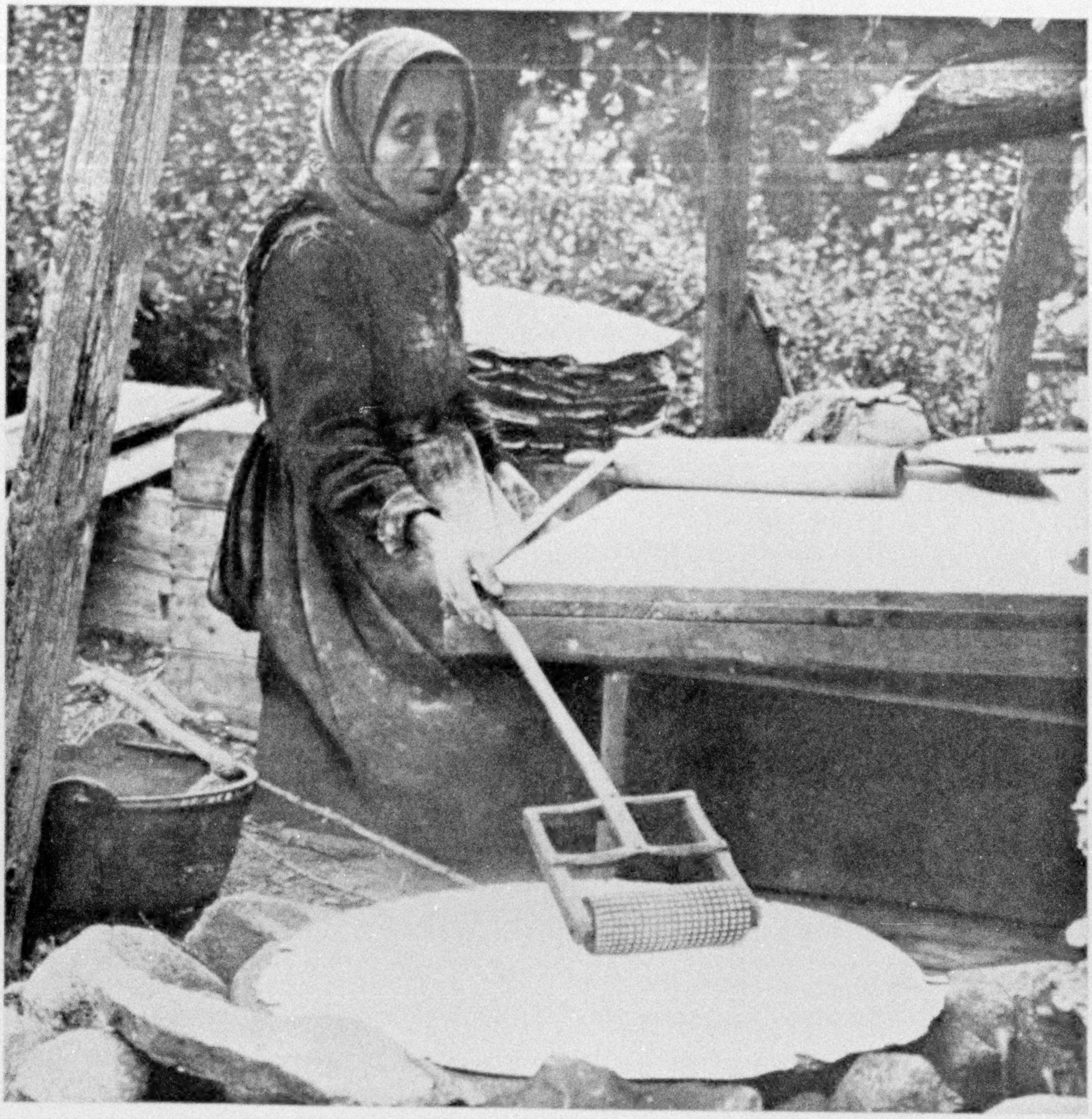
MAKING THE "FLAT BREAD" OF THE NORWEGIAN PEASANT

This Norwegian woman, now past her threescore years, is baking the well-known flat bread under a little shelter of dried branches. The dough for this bread is in the shallow dish in front and to the left of the old lady and is made of coarse barley meal and water. After being rolled thin, it is removed to the round, flat baking-stone in the foreground, under which a fire of fagots is kept burning. It is then stored in a dry place for the winter, when it forms one of the chief foods of the peasants.

down farms, Pasteur signalized that same generation with the lesson of how to save our domestic animals from the ravages of infectious diseases, and through that magnificent discovery gave man a weapon against human as well as animal infections.

In the middle period of the nineteenth century an epidemic of anthrax fever broke out in Europe and ravaged the cattle regions of the Old World. Not only was it one of the most dreaded of diseases because of its great fatality rate, but it is also a most loathsome disease, producing sores and abscesses in its victims, and it attacks animals and men alike.

By the middle of the century sheep and cattle raising in some parts of Europe was practically abandoned; in many places the dairying industry was wiped out, and it seemed that nothing could



Photograph and copyright by Keystone View Co.

ANOTHER VIEW OF THE NORWEGIAN FLAT-BREAD BAKERY

The pile of sheets of bread to the left of the old woman shows that in spite of her old age she is a faithful worker

stop the constantly extending sweep of the malady.

At that time the world did not know that infectious diseases were caused by germs. A little later the science of bacteriology began to develop, and the great French savant Pasteur finally succeeded in demonstrating that anthrax fever is caused by a definite germ. After determining the cause of the disease, he undertook to work out the problem of combatting it.

He found that the germ of anthrax fever, when cultivated in chicken broth for several generations, loses its ability to produce the disease. Not only this—he proved that when this bacillus loses its ability to produce disease, it gains a new quality, that of rendering animals immune from the attacks of uncultivated bacilli. With these facts in hand he announced that he could render sheep and cattle immune against anthrax by inoculation.

ONE OF THE MOST DRAMATIC SPECTACLES OF HISTORY

When he made this announcement he was greeted by a storm of derision on

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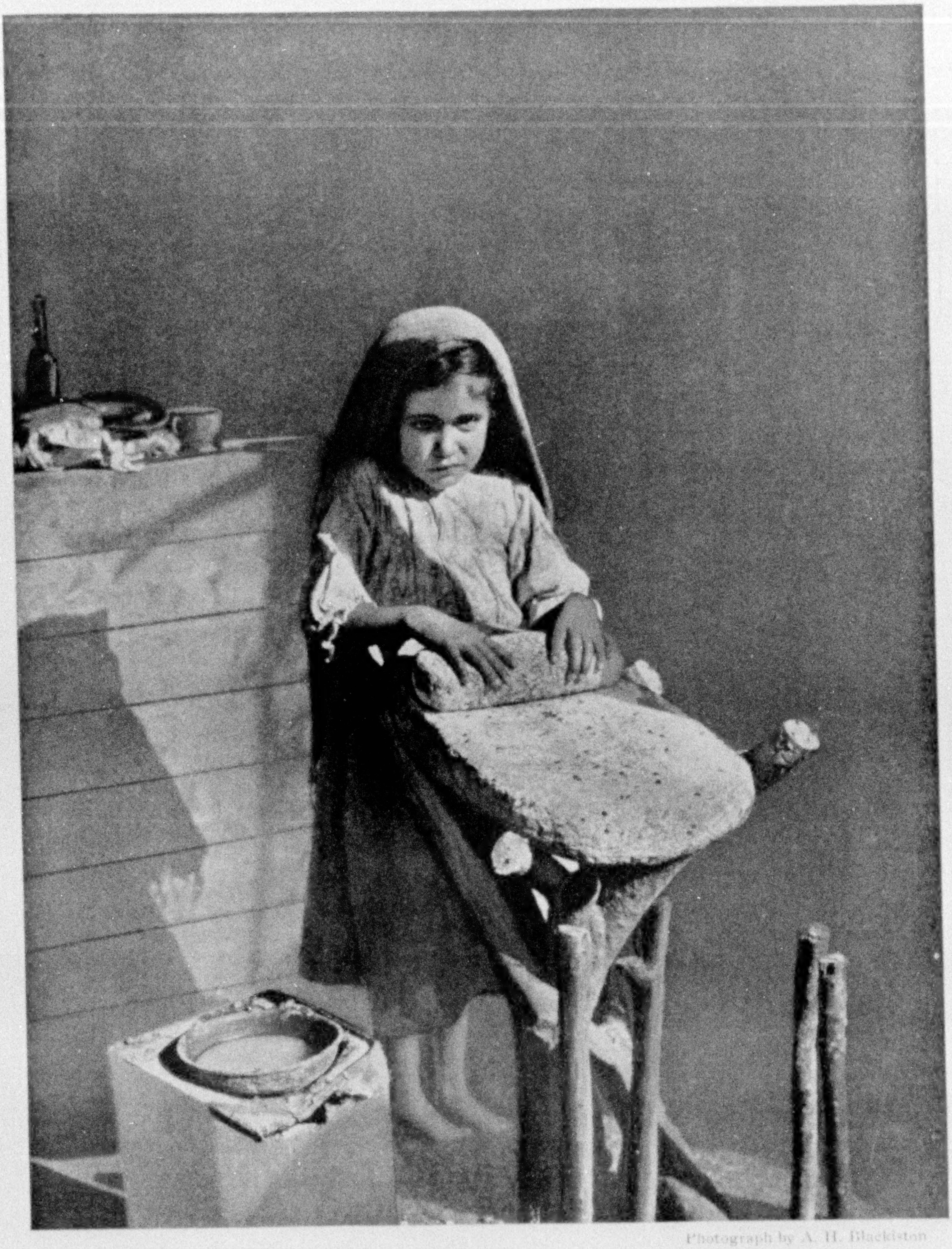
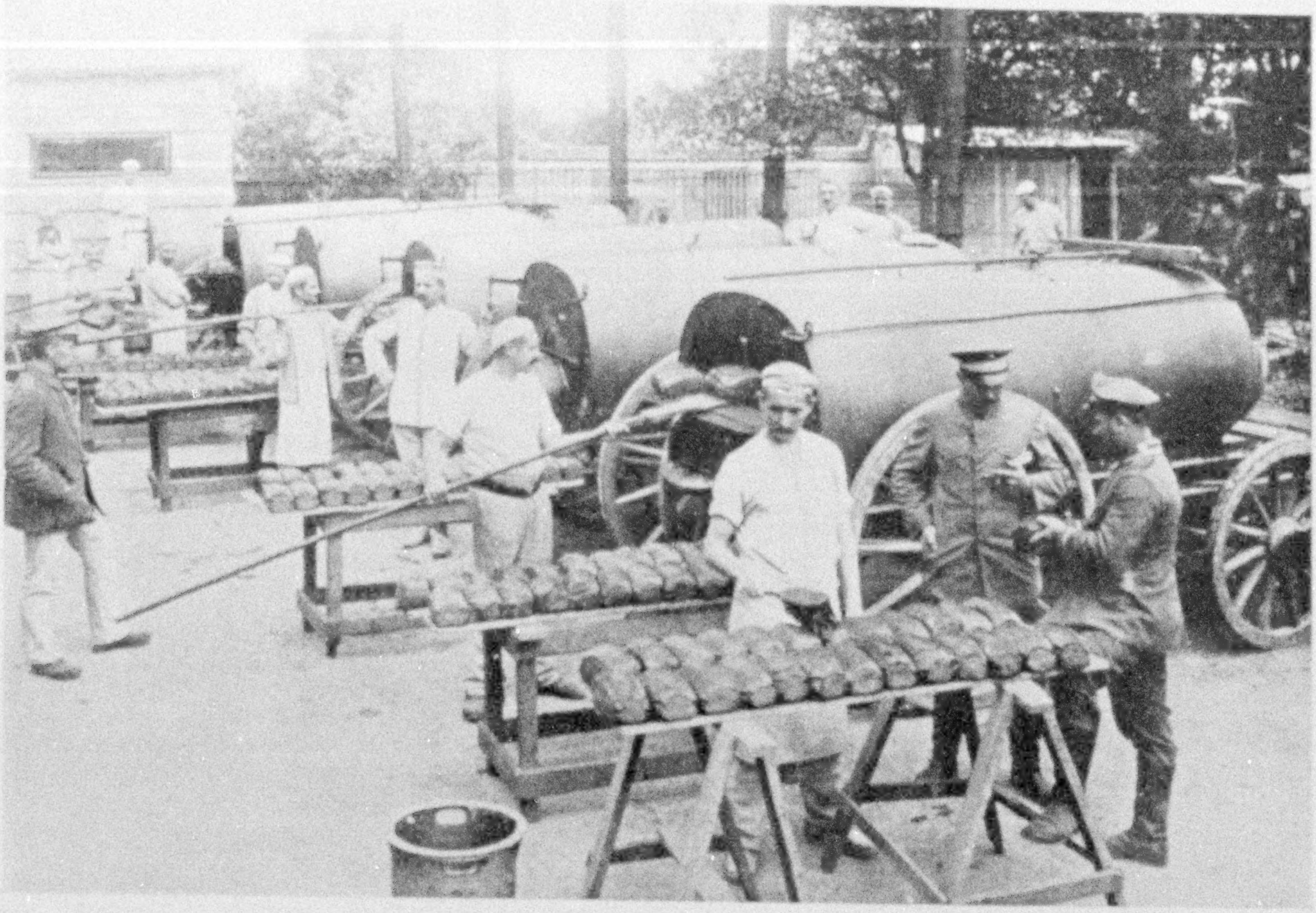


Photograph by A. H. Blackiston

MAKING TORTILLAS; MEXICO

The tortilla is a sort of flapjack rolled out on a primitive "dough board" of stone, with a rolling-pin which Nature manufactured by centuries of water-attrition. The oil-can in the foreground is the water bucket of the peons of Mexico.



Photograph by Henry Ruschin

A GERMAN ARMY FIELD BAKERY

the part of the uninformed and by a wave of skepticism at the hands of the scientific world. The president of an agricultural society offered to furnish him a drove of 50 sheep, half of which were first to be inoculated with the cultivated virus, and later the whole flock was to be inoculated with the uncultivated variety. They were then to be kept together in one pen under precisely the same conditions. If the vaccinated sheep remained healthy and the unvaccinated ones died of anthrax, it was to be accepted that Pasteur had proved his case.

The challenge was accepted, two goats being substituted for two of the sheep, and ten cattle being added. On May 5, 1881, the preventive inoculation of half of the sheep was undertaken, and was repeated on May 17. On May 31 all sixty of the animals were inoculated with uncultivated germs.

Two days later a vast crowd, composed of veterinary surgeons, newspaper correspondents, farmers, and scientific men, gathered to witness the closing scene of this remarkable test. And they saw one of the most dramatic spectacles in the history of peaceful science. Every animal that had not been vaccinated with the anthrax-preventing virus was either dead, dying, or in the last stages of the disease, while not a single one of those which had been vaccinated had contracted the malady. In the course of a few hours every infected animal in the compound was dead, while every one that had been vaccinated was in perfect health.

This discovery soon released Europe from the thraldom of the epidemic of anthrax, and it laid the foundation for preventive medicine as applied to domestic animals so firmly as to insure mankind against the conquest of his animal food supply by the microscopic creatures that cause such epidemics as anthrax, cholera, and the foot-and-mouth disease.

TEACHING PEOPLE HOW TO FARM

The great need of the world in the future is not so much more acreage to cultivate as a better handling of the acreage already under cultivation. While it is estimated that the total area now actually used in growing crops amounts to

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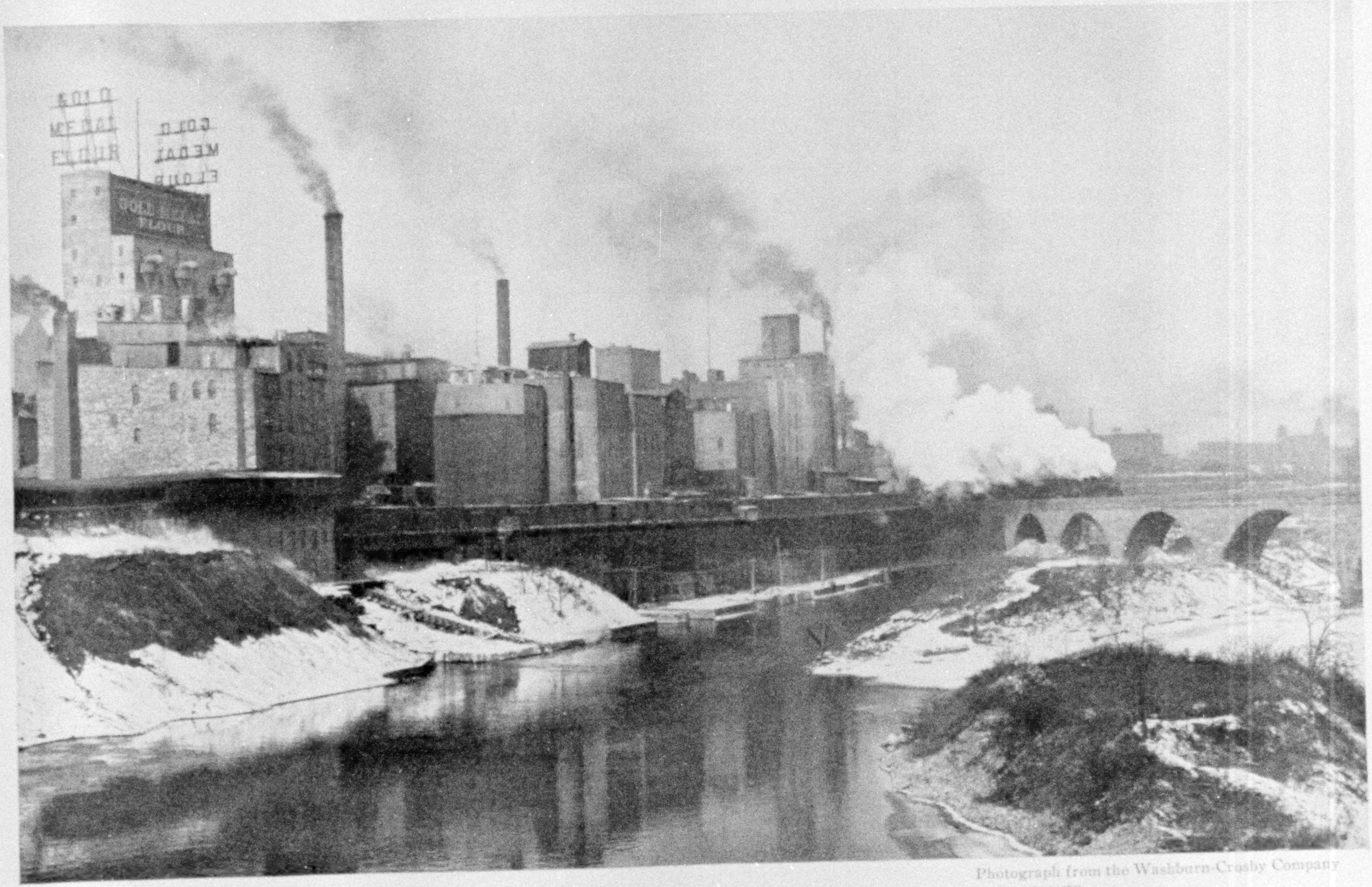
GOLD MEDAL FLOUR
GOLD MEDAL FLOUR
GOLD MEDAL FLOUR

Photograph from the Washburn-Crosby Company

THE MINNEAPOLIS MILLING DISTRICT AS SEEN FROM THE MISSISSIPPI RIVER

This is the center of the flour-producing district of America. A single plant has a capacity of 40,000 barrels of flour a day. It uses 150 carloads of wheat daily and turns out flour enough to furnish 9,000,000 people with their daily bread. From incoming wheat to outgoing flour there are twenty-three processes.

Photograph from Corby Bros.

THE BREAD RACKS OF A MODERN BAKERY IN THE NATION'S CAPITAL

There are 24,000 bakeries in the United States, employing 100,000 people and producing $400,000,000 worth of bread, crackers, pies, and cakes a year. These figures do not include those which do a business of less than $500 a year nor hotels. Our bakery products are worth as much as those of our creameries and vegetable canneries together.

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Photograph by Harris & Ewing

SECRETARY OF AGRICULTURE HOUSTON PRESENTING WALTER LEE DUNSON A DIPLOMA AS THE CHAMPION BOY CORN GROWER OF THE UNITED STATES

only about 15 per cent of the total landed area of the world, it has been demonstrated that with scientific agriculture this area itself might suffice to feed a population vastly greater than that now living.

With all of her teeming millions, only 18 per cent of Asia's land, 12 per cent of that of the Americas and Africa, 27 per cent of that of Europe, and 5 per cent of that of Australia have ever felt the touch of the plow. Without encroaching at all upon the world's forests, but using only the steppes, pampas, savannas, and prairie lands, there might be added to the earth's farming lands an area twice as great as that now under active agricultural operations.

The United States has been working along lines looking more to the extension of scientific methods to the present cultivated acreage, than to the extension of farm operations to new acreage. The bulk of the $30,000,000 it now spends annually, through its Department of Agriculture, is for the improvement of farming methods. In latter years a program for the taking of the gospel of good farming to the farmer himself, and demonstrating it in practice, instead of writing it down upon paper, has been productive of very wonderful results.

In the club work of the last fiscal year hundreds of county agents of the Department of Agriculture, working in thirty-three States, went out upon the farm and showed the farmers themselves how to increase their yields. The thousands of farmers who accepted the offer to farm under the direction of the Department of Agriculture increased their yield of corn nine bushels per acre, their wheat seven bushels per acre, and their oats ten bushels per acre.

Photograph from U. S. Department of Agriculture

JERRY MOORE, OF FLORENCE COUNTY, SOUTH CAROLINA

Jerry is a twentieth century farmer. South Carolina soil returned him 228¼ bushels of corn to the acre.

TEACHING THE YOUNG IDEA HOW TO "SHOOT" GOOD CROPS

But probably more significant even than the work among the farmers themselves, has been the work among the boys and girls. Sixty thousand boys and fifty thousand girls were enrolled in club work in the Southern States last year. Many of the boys were organized into clubs to raise pigs and poultry, others into clubs for demonstrating the advantage of four-crop rotation in southern farming, and still others into clubs for the growing of winter legumes for soil improvement. Girls were taught to make house gardens and to preserve for home use the garden products as well as the waste fruits and vegetables of the entire farm.

In the north and northwestern States 150,000 boys and girls were enrolled, the leading club projects being the growing of corn and potatoes and garden and canning work.

The success that has followed these activities has been wonderful, demonstrating to the farmers that their children can accomplish marvels of which they never dreamed. Ten girls in Mississippi produced 27,850 pounds of tomatoes on ten one-tenth-of-an-acre plots. They were working as a team for a prize given by Kentucky business men. The value of their tomatoes was $1,179, and the profits on their joint plots—together only one acre in extent—amounted to $868.

Ten boys in Alabama averaged 171 bushels of corn to the acre. The people in their several communities no longer have a contempt for the farming experts of the Department of Agriculture. Heretofore they have always urged that with the money of Uncle Sam to spend it was but natural that large yields could be gotten, but that the average farmer could not afford to duplicate these methods. The boys and girls who have taken part in these contests have given such an effective answer to these contentions that even the inertia of the indifferent farmer has been overcome. Many other kinds of club work is being done.

Photograph from U. S. Department of Agriculture

CLUB MEMBERS SELECTING THEIR SEED IN THE FIELD BEFORE FROST

The farmer who sees that every grain he puts into the ground is one able to produce a hardy sprout lays the foundation for a big crop

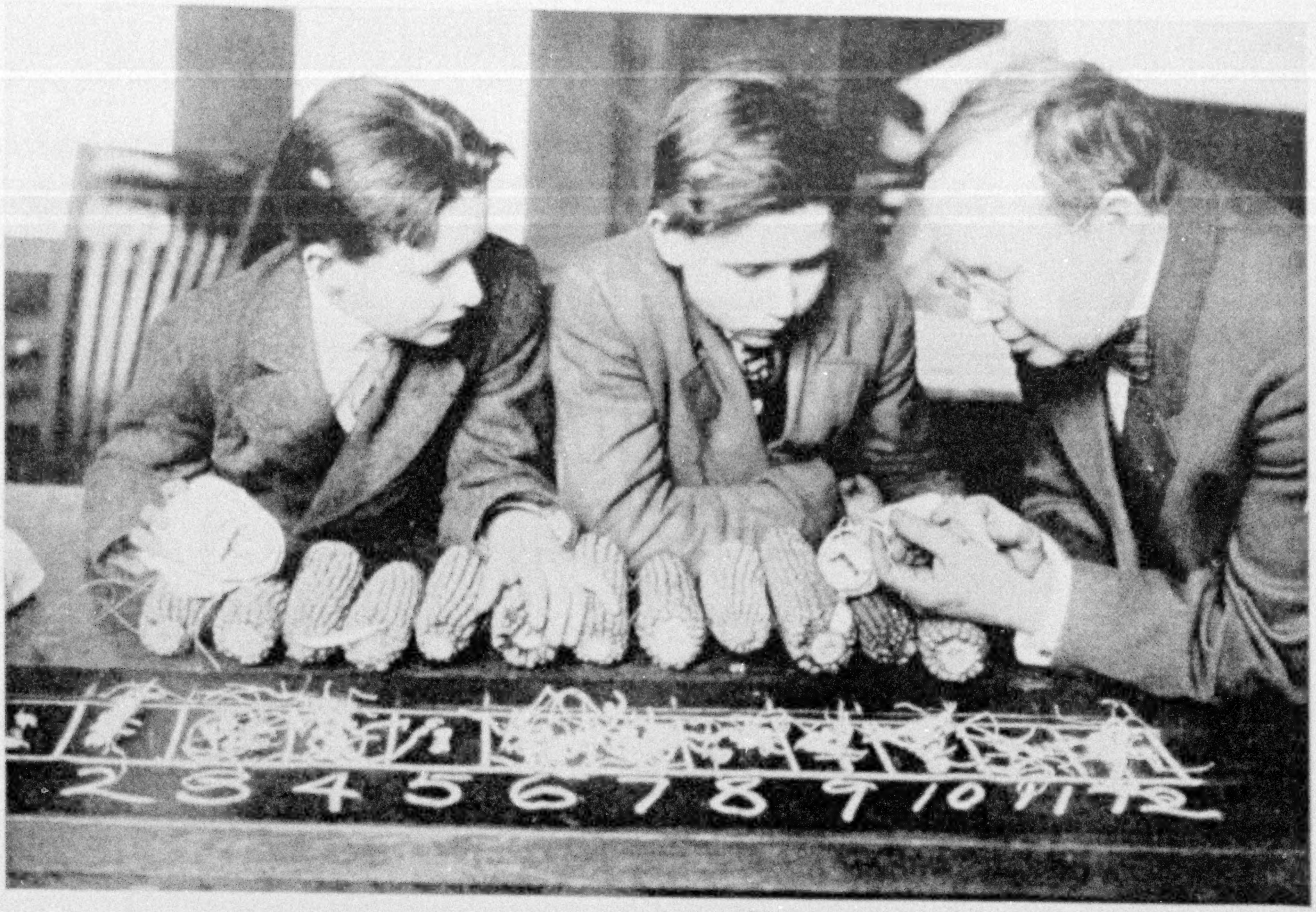
In Oregon a packing-house distributed a carload of brood sows among the children of the Hood River region of that State and of Washington. They were sold on credit to these boys and girls, who agreed to raise them according to the Department of Agriculture specifications.

The buyers were charged 6 per cent interest on the purchase price, to be paid out of the profits from the pigs raised. The school officials of the Hood River region have charge of the experiments, and those boys and girls doing the best work and making the best reports are to be awarded scholarships to the State University, and other prizes.

THE STORY OF A LOAN

A farmer in Macon, Georgia, who carries a large bank account, went to his bank with his twelve-year-old son and endorsed the latter's note for ten dollars. The cashier inquired of him why he was having his boy borrow ten dollars when he himself had so much money in the bank. The farmer replied that his son was going to enter a boys' pig club, and that he wanted him to acquire a banking experience as he went along. He said that it was worth ten dollars to him to see how his boy handled the loan.

An Alabama philanthropist hit upon another idea for increasing pig-raising in his community. He bought twenty pigs and sold them to as many boys, the bargain being that when the boys brought him two pigs to take the place of the one thus sold, the debt should be considered discharged. The philanthropist then took these two pigs and gave them to two



Photograph from U. S. Department of Agriculture

EXPLAINING THE RAG-BABY TEST IN THE GERMINATION OF SEED CORN

Six grains of corn are taken from each ear and wrapped in rags, which are then moistened and set away for germination. After the grains have had time to sprout, the rags are opened and the seeds examined. Some ears yield no sprouting grains; others yield grains that sprout weakly; still others yield grains with a "batting average of 1,000 per cent." These are the ones which produce good corn crops.

Photograph by Frank H. Bothell

CHILDREN BRINGING SAMPLES OF MILK TO BE TESTED FOR BUTTERFAT: BOUNTIFUL, UTAH

XUM

Photograph from U. S. Department of Agriculture

POLKTON POULTRY CLUB: ANSON COUNTY, NORTH CAROLINA

"If the rural housewife will not come to the school of domestic science, we will take that school to her." Such is the latest idea in agricultural extension work. Under the new Smith-Lever Law, the U. S. Department of Agriculture will, besides organizing dairying, poultry, textile, and food study clubs, giving lectures, and conducting correspondence courses, send its agents directly into the homes and show the housewives how to make all sorts of labor-saving devices, from a fireless cooker costing twenty-five cents to a roller table to carry the family meal from the kitchen stove to the dinner table (see text, page 101).

other boys under similar terms. In this way he has planned an endless chain of pigs and an ever-increasing circle of boy club members.

It seems certain that the wonderful results achieved through the boys' and girls' clubs in the United States will eventually lead to their adoption by every progressive government. Probably no other work can be as influential in promoting the world-wide adoption of modern methods of farming as the work among the children.

That habit of mind of the grown-up which makes a man ashamed to be outdone by a child, serves to stimulate the adult farmer when the children of his community are engaged in club work. The enthusiasm of youth is thus capitalized, and the nearly 300,000 boys and girls who are now engaged in this work in America will form a future army of food producers, who will not only be good farmers and farmers' wives, but who will inspire hundreds of thousands of others to profit by their examples.

ALL ROADS LEAD TO THE DINNER TABLE

Could we, like the great French writer, Maupassant, turn lose our fancy as we dine, we could see a great army of men and women working that we might eat. The appetites of men now levy tribute upon all the continents and all the seas,

Photograph from U. S. Department of Agriculture

EARL HOPPING AND HIS GOAT

If every American farmer raised as much corn to the acre as this Arkansas boy, with a one-goat team, the United States alone would grow as much corn as the whole world produces, with a billion bushels to spare (see text, page 29).

and where once all roads led to Rome, now they come directly to our dinner tables.

Let us sit down to dinner and go over the menu and try to list those who have assisted in the preparation of our meal.

At the top of the list come olives and salted nuts. The olives mayhap are from Spain, the almonds from California, and the pecans from Texas. The salt on the nuts was prepared in New York State. Also we have celery that came from Michigan.

Then comes the soup. Without a cookbook at hand, this writer will not pose as an authority on the ingredients of soup, but it may be Chesapeake Bay clam chowder, which certainly has some pepper from Africa in it and other ingredients from far and wide.

Our fish is salmon from Alaska, and our prime ribs of beef came to our table through the Kansas City "packingtown." Our potatoes came from Maine, our boiled rice from China, our string beans from Florida, and our tomatoes from Maryland.

Next comes our salad, and it contains—if a man may guess at the contents of salads and dressings—Mexican peppers, Hawaiian pineapple, Sicilian cherries, Pennsylvania lettuce, Iowa eggs, Spanish olive oil, Ohio vinegar, California mustard, and Guiana red pepper.

When we get down to the ice-cream, we eat Virginia cream, Cuban sugar, Ecuadorean vanilla, and Mexican chocolate. The cake that goes with it is made of butter from Illinois, flour from Minneapolis, made from wheat grown in North Dakota; baking powder from Pennsylvania, and other ingredients.

When it comes to coffee, if we are fastidious we will have issued a draft on both Turkish Arabia and Dutch Java, or if we are only folk of every-day taste we

XUM

Photograph from U. S. Department of Agriculture

A CHAMPION UTAH GARDENER CONVERTING HER POTATOES INTO STARCH

The total value of the product of boys' and girls' clubs and those for women in Utah for 1915 amounted to $63,843, secured at a cost of $3,358 for the extension work. It is the ultimate purpose of the United States Department of Agriculture to spend $5,000,000 a year in teaching the farmers' wives and daughters the art of home economics.

Photograph by Frank H. Bothell

BOY CLUB MEMBERS LEARN HOW TO MAKE BIG PORKERS OUT OF LITTLE PIGS

An Alabama philanthropist has applied the endless-chain idea to pigs. He bought twenty little sows and sold them to as many boys. Each boy undertook to raise his pig and to give the philanthropist two little ones from the first litter farrowed as payment. These in turn are to be delivered to other boys on the same terms, the philanthropist assuming all risks (see text, page 102).

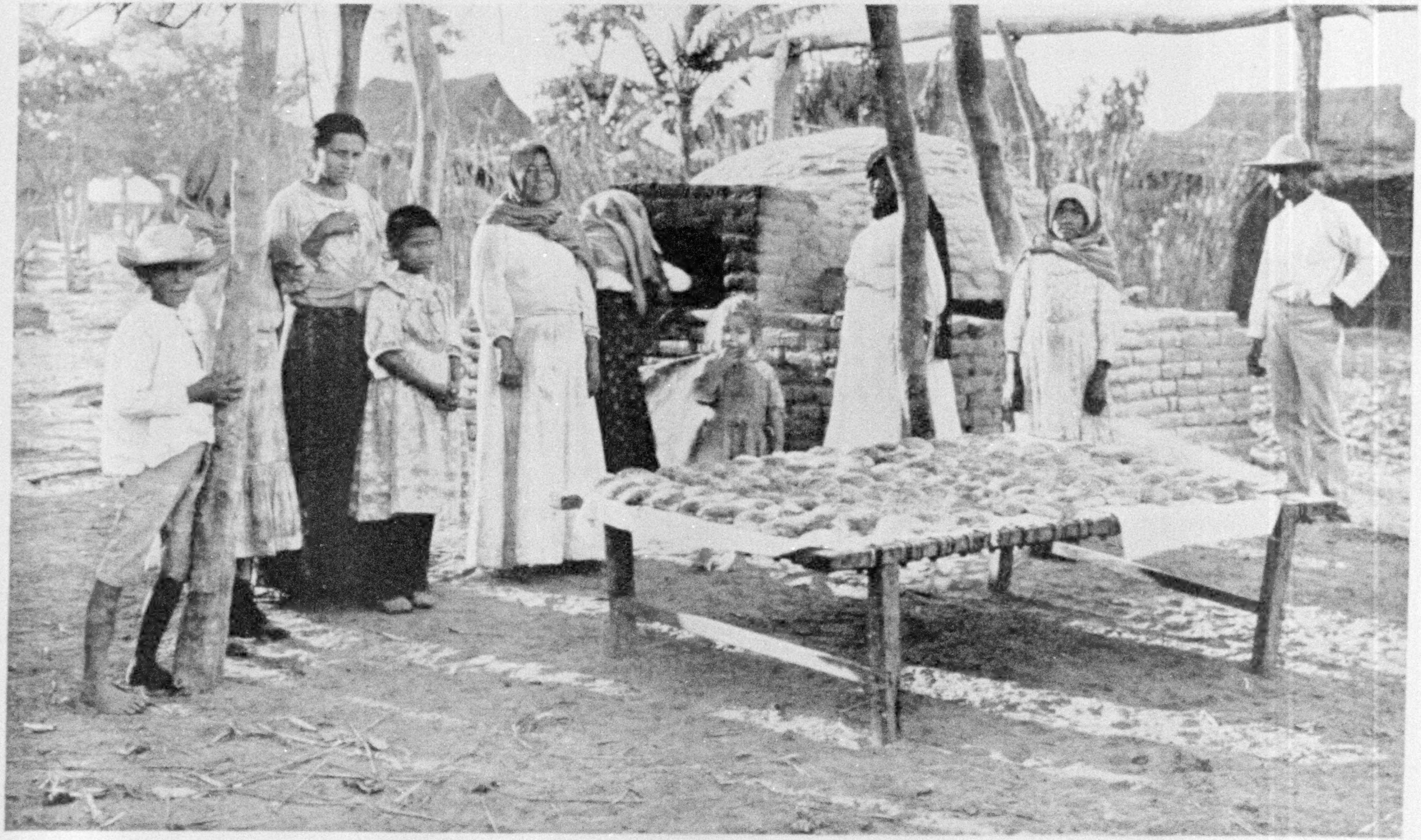
XUM

Photograph by Miller Photo Co.

STACKING HAY BY HORSE-POWER

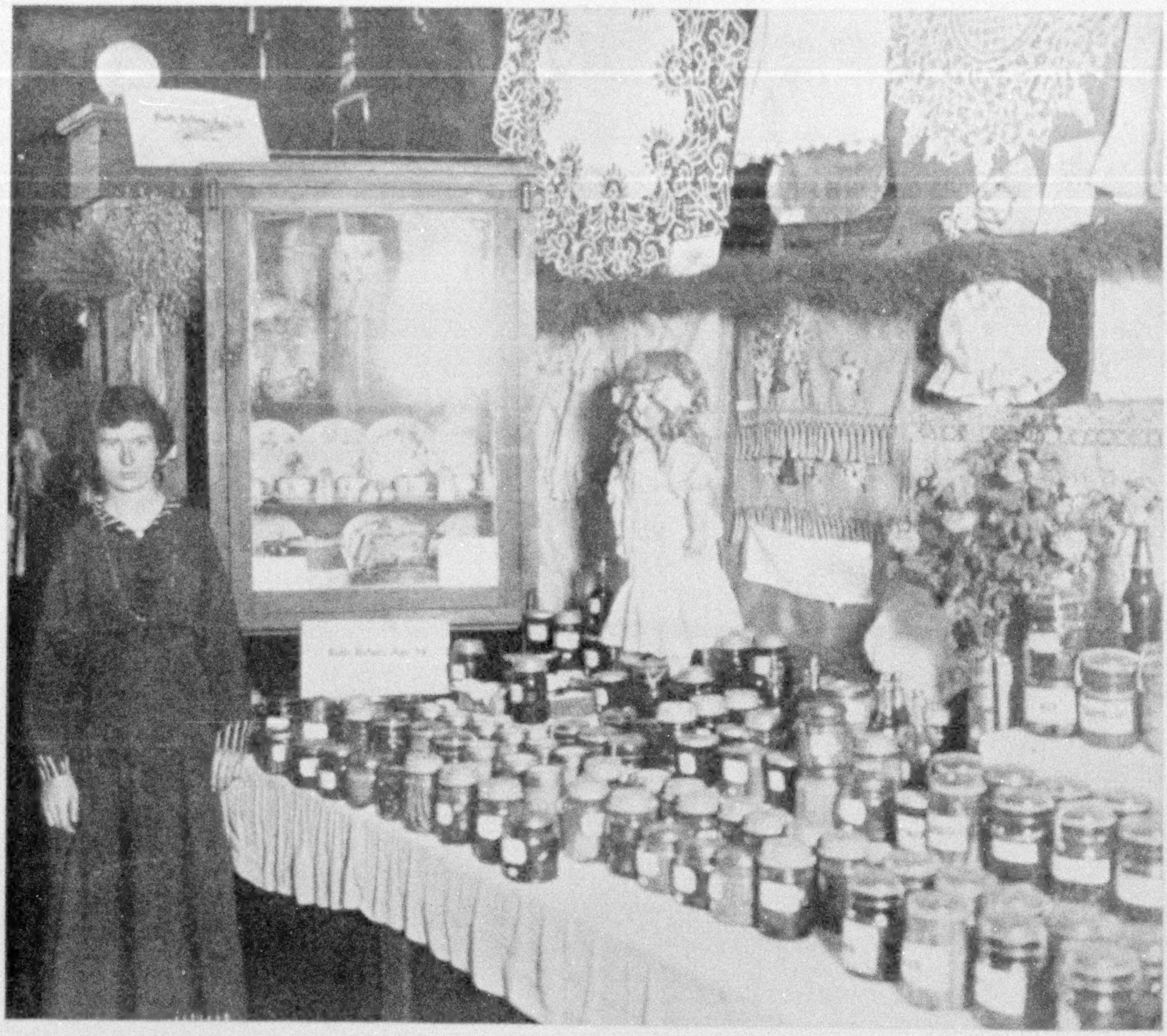
The United States devotes 72,000,000 acres of land to hay and other forage crops. Were this used to grow potatoes, even at our present rate of production, it would yield 6,480,000,000 bushels, which is more than the whole earth produces today. The passing of the horse will release this area to human food production.

XUM



A MEXICAN OUTDOOR BAKERY

Although the tortilla reigns in Mexico, revolution or no revolution, bread baked in outdoor ovens is its principal rival for popular favor. The oven is first heated by a roaring fire. After it is thoroughly hot, the fire is withdrawn, and the unbaked dough put in its place. The heat of the brick bakes the bread.



Photograph by Frank H. Bothell

RUTH BYBEE'S EXHIBIT AT THE STATE FAIR, UTAH

This little girl made every article in the exhibit and dressed the doll for good measure. Her Battenburg lace, her hand-painted china, no less than her jellies, jams, and pickles, show how good training may make a girl independent (see text, page 101).

will content ourselves with the Brazilian product.

THE WORLD OUR SERVANT

And so, when we come to reckon up those who have helped produce the raw materials of which our foods are made, we find the clouted African savage and the American stock grower; the South American Indian and the California truck farmer; the Javanese coffee picker and the Virginia dairyman; the turbaned Arabian and the New York orchardist; the Chinese coolie and the Dakota wheat farmer; the Mexican peon and the Chesapeake Bay fisherman; the Porto Rican planter and the Hawaiian sugar grower; the Spanish olive packer and the Alaskan Eskimo fisherman.

Yet all these neglect the matter of transportation. Our food comes to us on the heads of Indians, on the backs of donkeys, drawn in carts by huge water buffaloes, aboard the "ship of the desert," on wheelbarrows propelled by Chinese coolies. Steamships, railroad trains, auto trucks, and delivery cars have all played their part in the great work of catering to discriminating appetites.

Truly the man who dines well ought to be a deep student of geography, for all races, all nationalities, all types of people, all points of the compass, all latitudes—continent, island, river, and sea—all must come to him as he looks over the bill of fare and tries to find those things that delight his palate.

THE SOUTH FRONT OF THE WHITE HOUSE

One of the Unusual Pictures in the Wealth of Color and Half-tone Illustration
Which Fill the Pages of "Washington—The Nation's Capital"

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35 Pages of Color Illustrations
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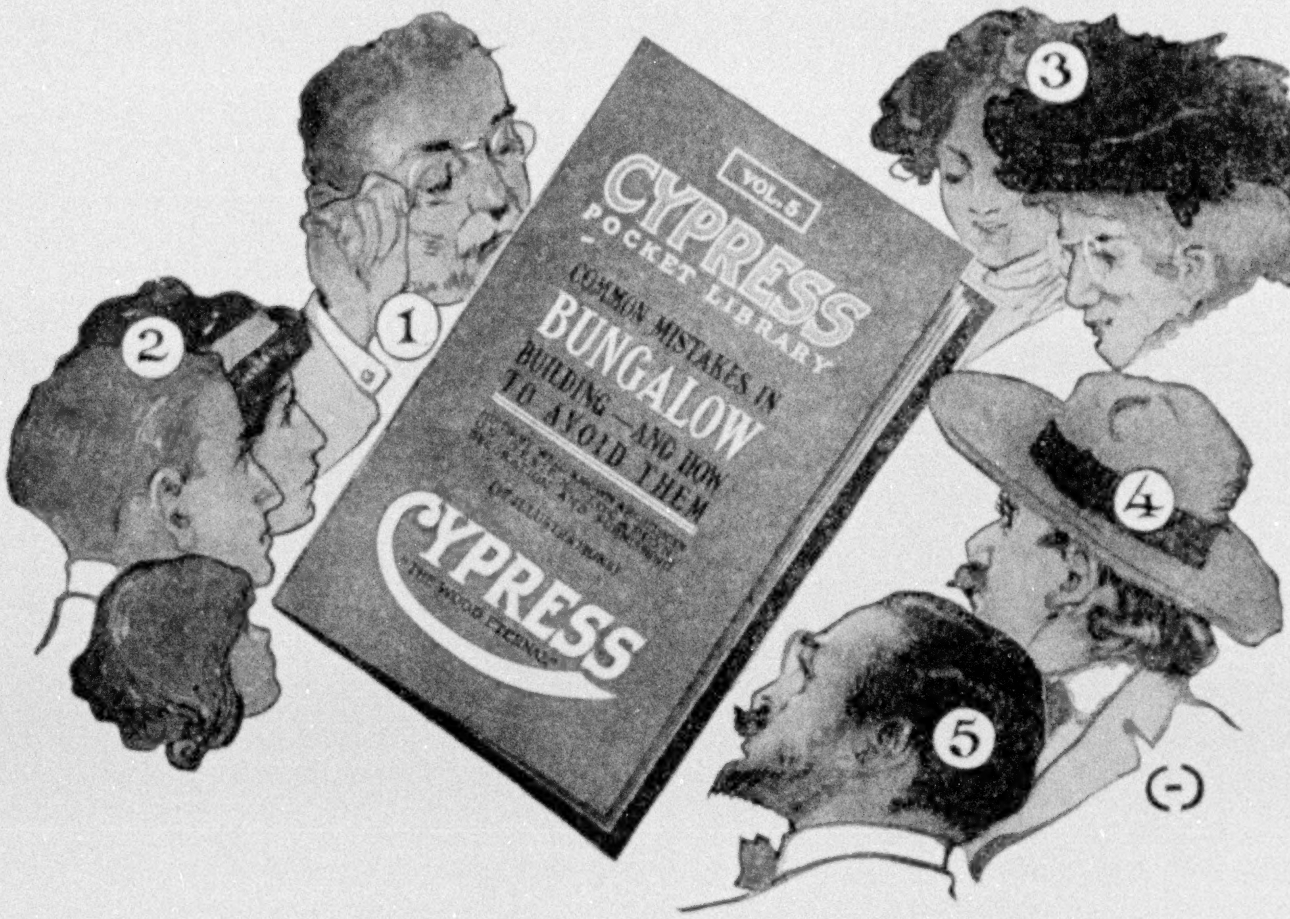

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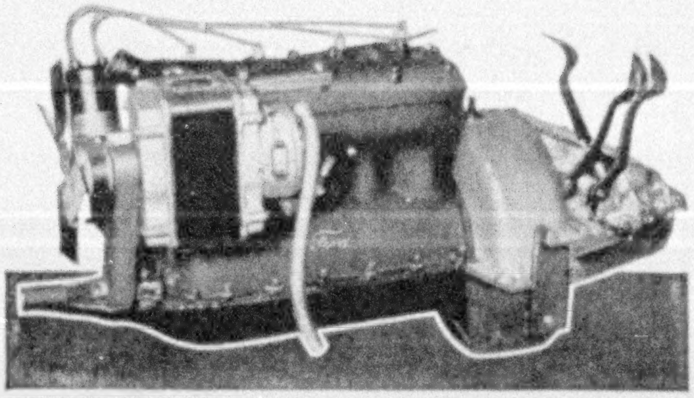

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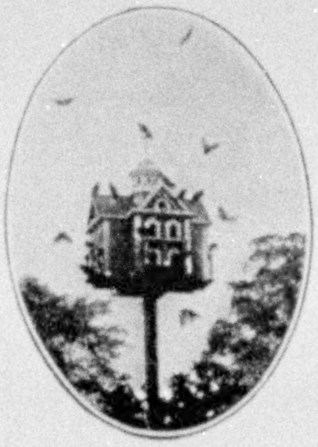

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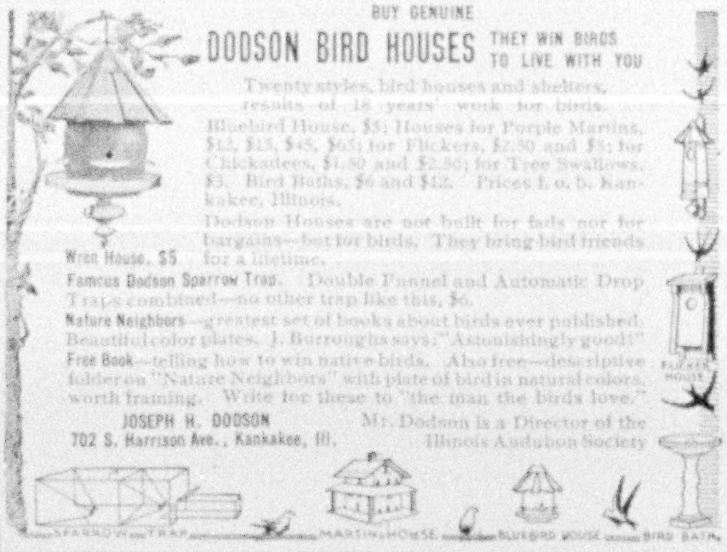

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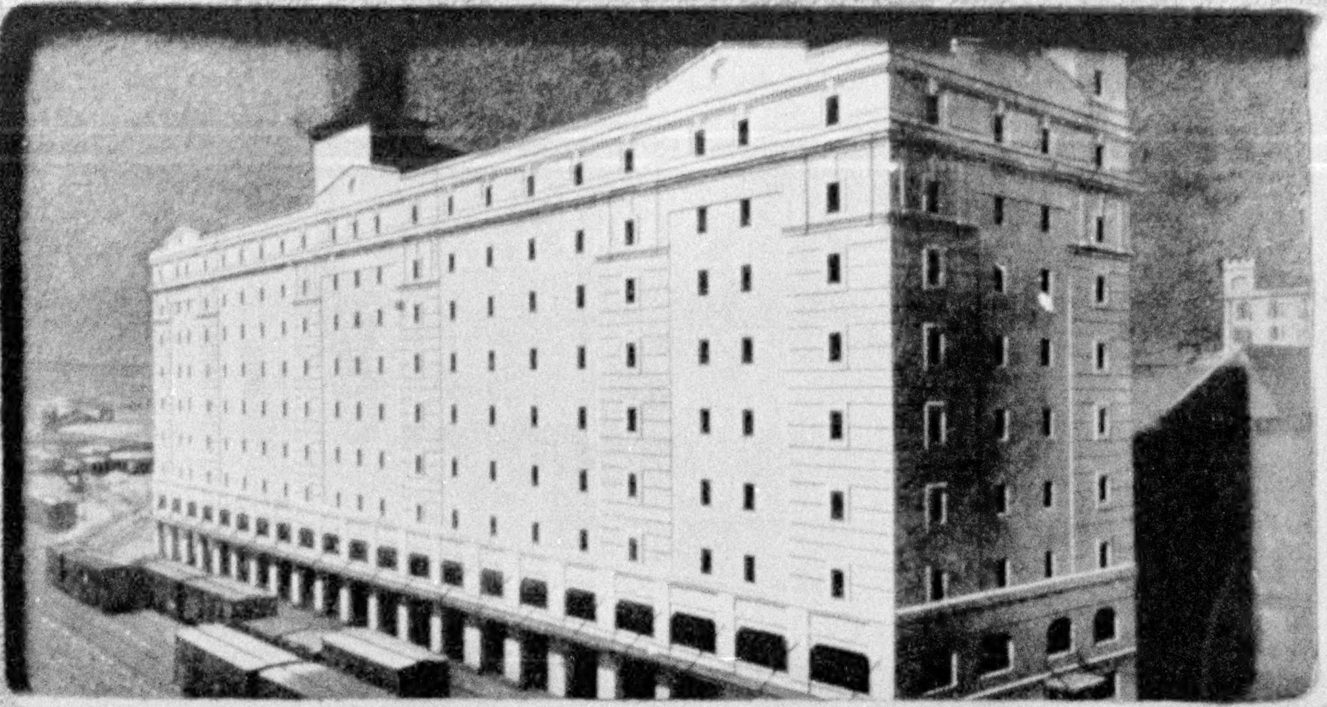

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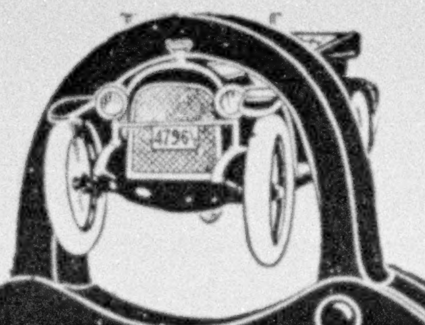

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The copyright notice must appear on each slide. The purchase of lantern slides does not carry with it the authority to publish the pictures and they cannot be used for advertising purposes.

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Dept. L, National Geographic Magazine
WASHINGTON, D. C.

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The popular need of a really official map is quite as great as the necessity for newspapers and magazines, for whoever reads at all reads about the war and seeks to understand the shifting battle lines in its several theaters. Such a map the National Geographic Society is now able to offer to its members and their friends in an up-to-date and thoroughly accurate chart of the entire area involved, from the Dardanelles to Petrograd; from Palestine to Portugal, and from western Ireland to eastern European Russia.

The requests for a comprehensive and reliable map were so numerous that at great expense the Society has had this map compiled and drawn from the best surveys of Europe, on a scale of 84 miles to the inch, giving every important city, town, and village, and as full of detail as legibility will permit.

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Extra copies of this map, which is 28 x 30 inches in size, and printed in four colors, at 25 cents per copy, postpaid; mounted on linen, 75 cents; Canada or Foreign, 12 cents addition for postage.

DEPARTMENT M, NATIONAL GEOGRAPHIC MAGAZINE,
WASHINGTON, D. C.

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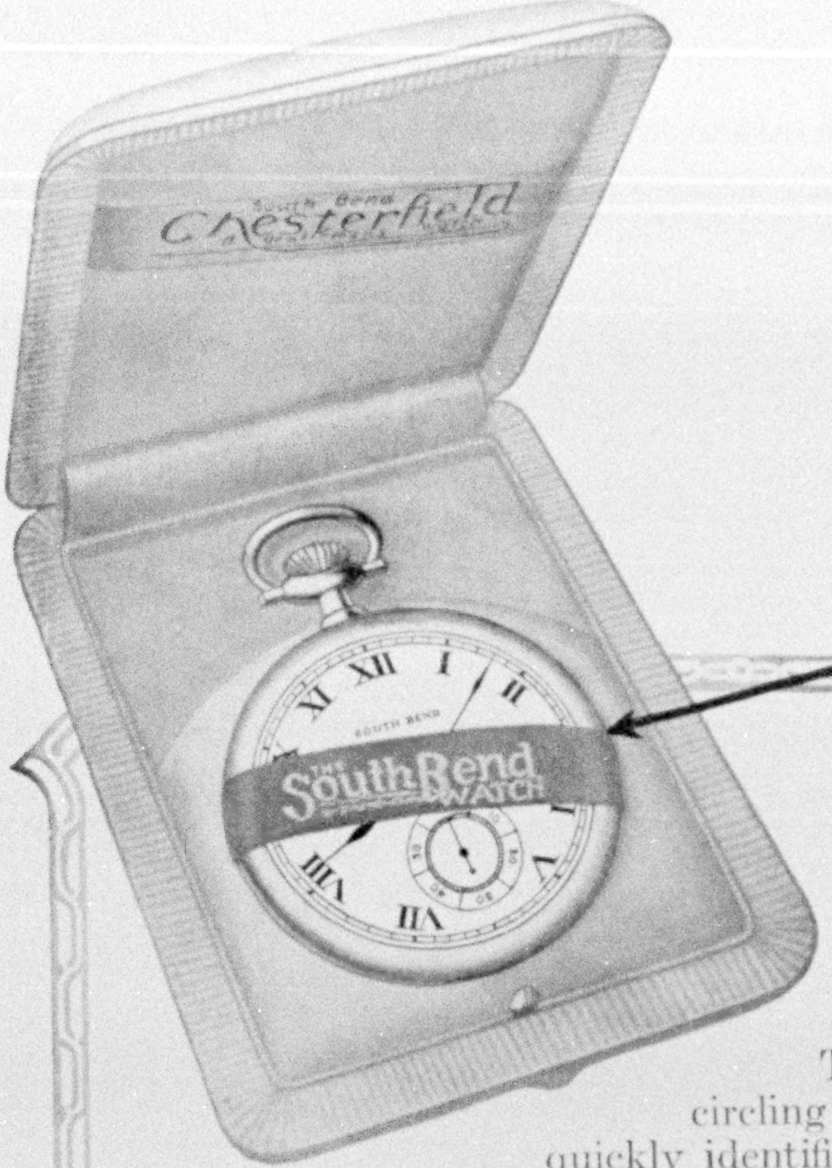

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Photogravure, 9½ x 13½ inches

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beautiful picture
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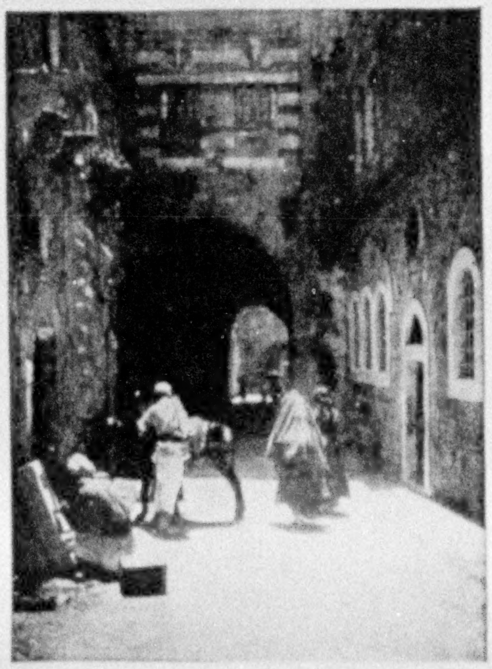

HOUSE OF THE RICH MAN—JERUSALEM
10 x 13 inches, in colors

Geographic Panoramas

THESE panoramas are published as supplements to the NATIONAL GEOGRAPHIC MAGAZINE, not merely because they are beautiful scenes, but by reason of the fact that they are both educational *and* artistic. They were selected from thousands of others to convey the most comprehensive pictures of wonderful and characteristic corners of the earth—the great Sahara, the matchless Matterhorn, the Panama Canal, the wonders of Mt. Robson, in the Canadian Rockies, and the Lure of the Frozen Desert.

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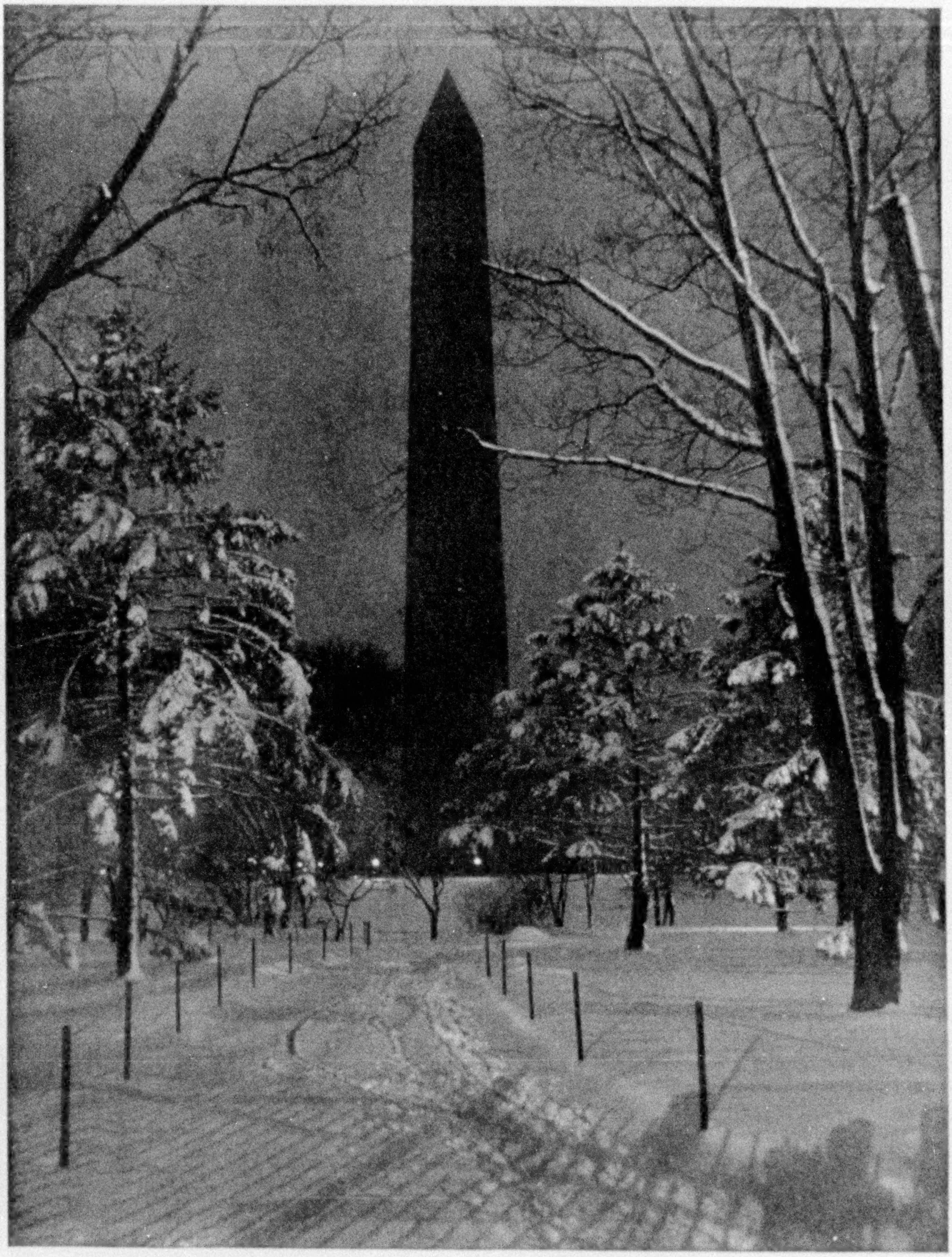

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35 Pages of Color Illustrations

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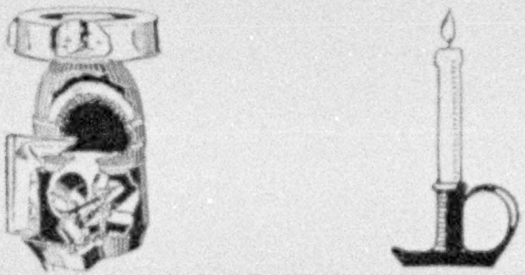

This cut-out view of the New-Feed UNDERFEED Furnace shows how it burns coal on the "candle" principle. Fuel is fed from below. Clean, effective flame always on top. All smoke, gas and dirt transformed into usable heat. No waste.

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The fabric is the strongest made. The tread is tough and durable.

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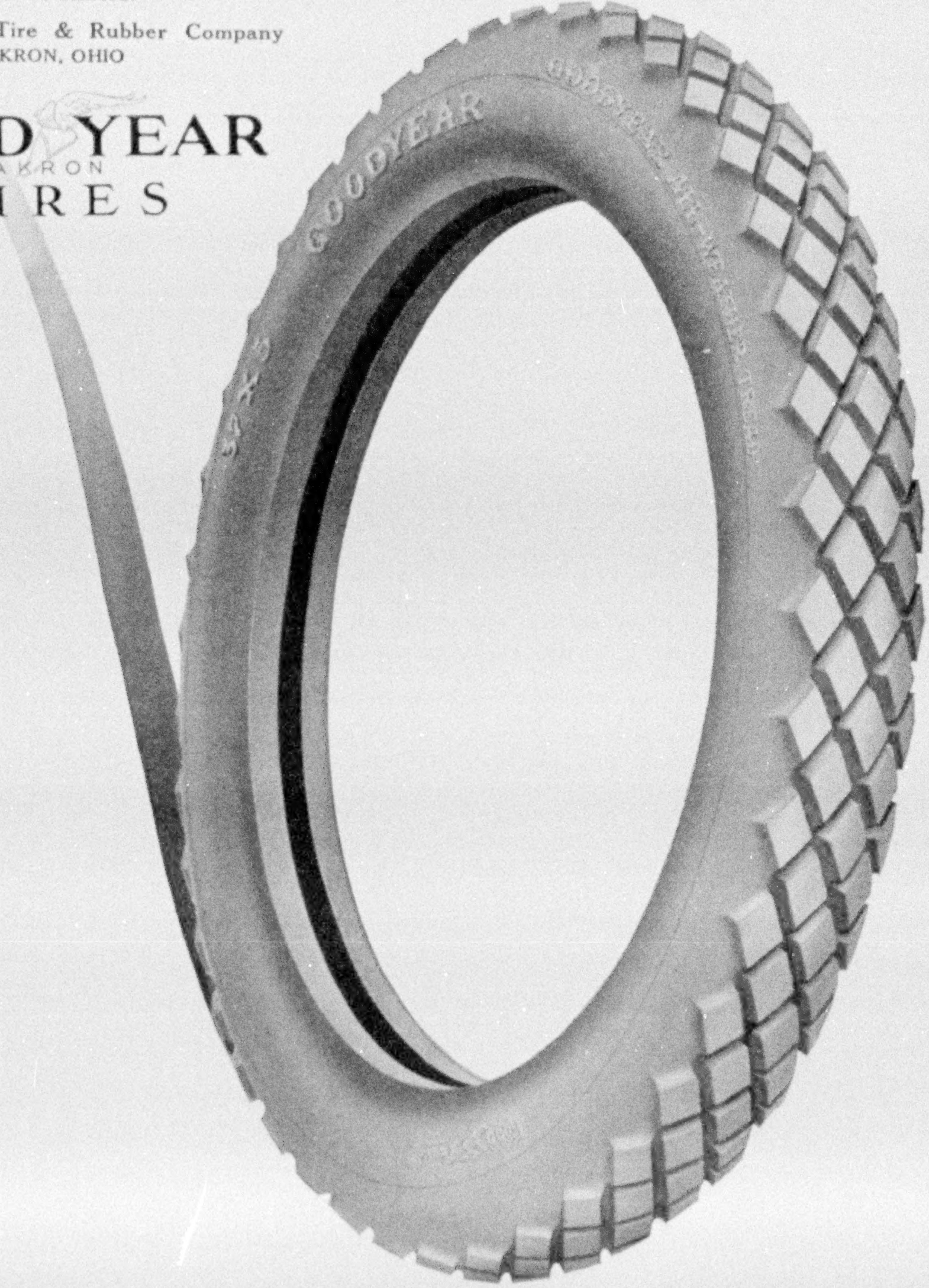

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Awarded the GRAND PRIZE

BY THE PANAMA-PACIFIC INTERNATIONAL
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Was conferred upon White Trucks by the Superior Jury of Award, as officially announced by the Secretary of the Jury under date of August Second.

This is the ONLY GRAND PRIZE received by any motor truck at the Panama-Pacific International Exposition.

This decision of the Superior Jury of Award reflects the opinion of the largest users of motor trucks throughout the world—and is in accordance with the actual service results of motor truck experience. The points of merit upon which the Grand Prize is awarded are identical with those that have determined the selection of White Trucks by America's foremost firms in every line of business.

White supremacy in the motor truck industry is thus recognized by the highest award that can be bestowed by the greatest exposition the world has ever known—just as this supremacy has been recognized by motor truck users for many years.

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The decision of the Superior Jury is final in the matter of Exposition awards. Hence any announcements of other motor truck manufacturers, claiming to have received the Grand Prize and Highest Award for motor trucks at the Panama-Pacific International Exposition, are automatically denied by this decision of the Superior Jury of Award.

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Largest Manufacturers of Commercial Motor Vehicles in America

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The Standard of Value and Quality

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Right now, we might tell you that this new Paige is a startling achievement.

We might tell you about its remarkable motor—its luxurious appointments—its rich French leather upholstery—its roomy seating arrangements for five full-grown passengers—its ample wheelbase and impressive European stream lines.

We might tell you about all of these features—and a great many more. But we much prefer that you shall establish them for yourself.

We want you to FIND in this car your ideal of what a five-passenger automobile really should be.

We want you to personally "discover" the car that you and your family have been waiting for and hoping for these many years.

We want you to set your expectations just as high as you possibly can. Then examine this new Paige and see if you are obliged to make one single compromise.

We ask you to do this for YOURSELF. We shall be quite content to abide by the result.

And, now, just a few words in explanation of the success which has come to this company in such generous measure.

First and foremost, let it be understood that Paige builds not for price—but for QUALITY.

REMEMBER, YOU CAN ONLY GET OUT OF A PRODUCT PRECISELY WHAT THE MANUFACTURER PUTS INTO IT.

There is no substitute for basic quality. No matter whether it be a typewriter, farm tractor, or automobile, service must be BUILT IN the product—not merely veneered on the surface.

Let us here, then, renew our bond of Faith with the American public.

So long as Paige cars are built, we shall unceasingly maintain our policy of building only GOOD cars—with quality our first and foremost consideration.

So long as Paige cars are sold, we shall remain keenly sensible of our obligation to see that these cars render unfailing service and continue to merit the confidence which has been reposed in them.

On this basis, we ask you to buy a Paige—not because of its price—but because of its name-plate.

We ask you to believe in these cars as WE believe in them. We willingly accept our share of the responsibility.

Paige-Detroit Motor Car Co.

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Fairfield "Six-46"
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Try this super-soap tomorrow morning. It is no farther away than the nearest dealer.

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Send 10 cents in stamps for a trial size of all four forms, and then decide which you prefer. Or send 4 cents in stamps for any one.

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